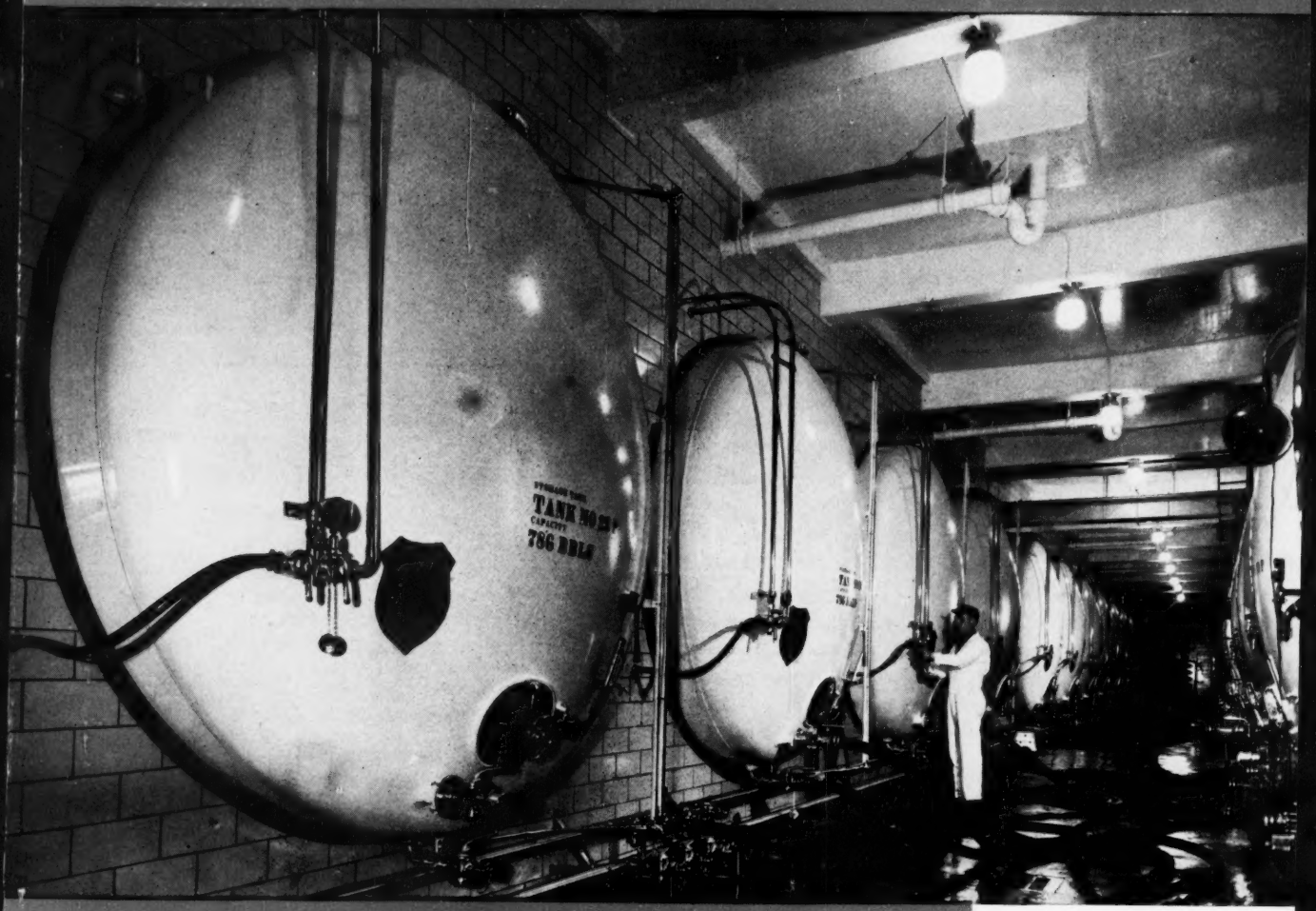
FOOD ENGINEERING

A McGRAW-HILL PUBLICATION • FORMERLY FOOD INDUSTRIES

April 1954

35 CENTS



ENGINEERED for efficiency, San Francisco Brewing's modernized plant includes latest thing in storage cellers. (Page 60)

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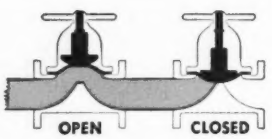
What valve would you specify?

The seven liquids cited above give dramatic emphasis to the all-around versatility required of a valve in the food field.

Grinnell has a valve that "fills the bill"... the Grinnell-Saunders Diaphragm Valve. Although employing only a single basic design, this unique valve provides a wide choice of body, lining and diaphragm materials.

To illustrate, for use on lines handling vinegar, stainless steel Grinnell-Saunders Valves equipped with butyl diaphragms are available. For handling beer, polished bronze valves are recommended with special white diaphragms which impart no taste or color to beer and are unaffected by caustic soda or steam cleaning.

The amazing adaptability of the Grinnell-Saunders Diaphragm Valves in handling highly corrosive fluids, gases, compressed air, beverages, foods and suspended solids... in lines where corrosion, abrasion, contamination, clogging, leakage and maintenance are costly factors... explains its acceptance by industry after industry. For further details, write for Grinnell-Saunders Diaphragm Valve Catalog.



Features which have made Grinnell-Saunders Diaphragm Valves the specified valve in many different industries:

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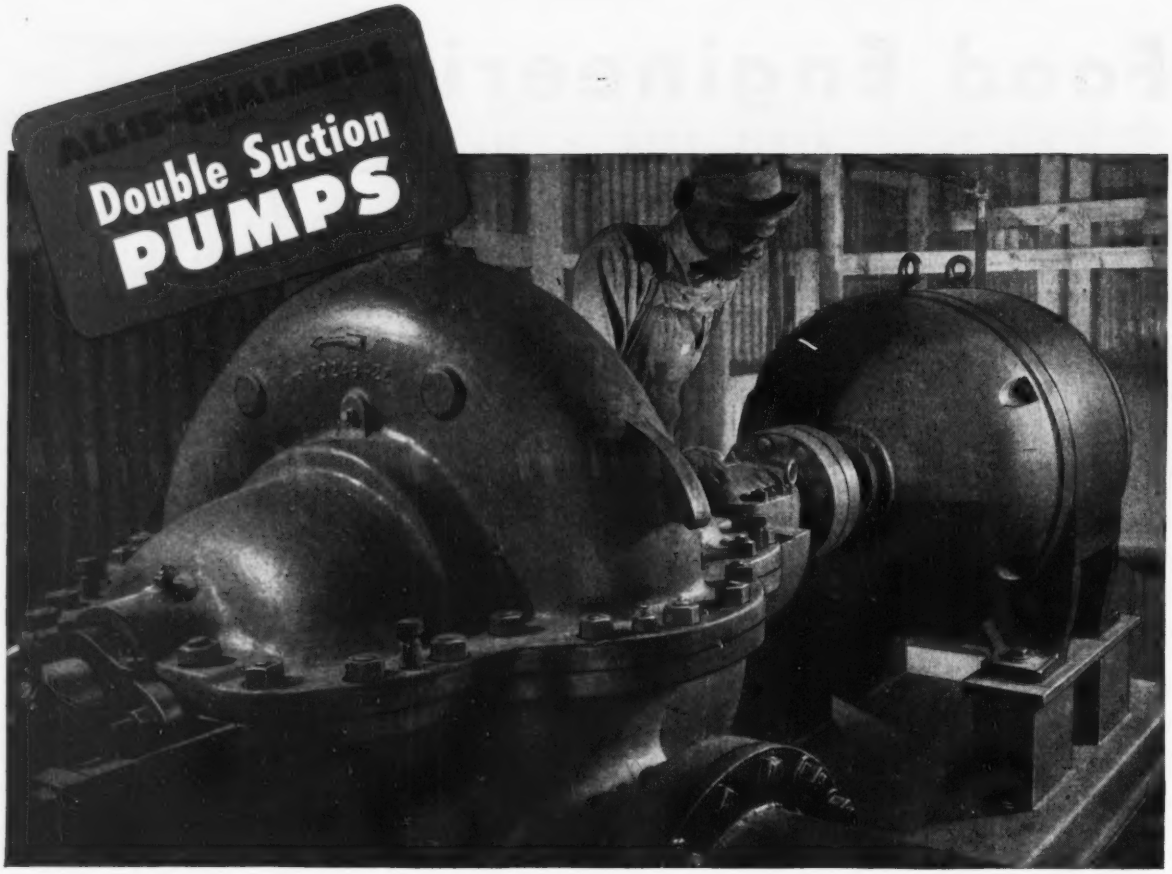

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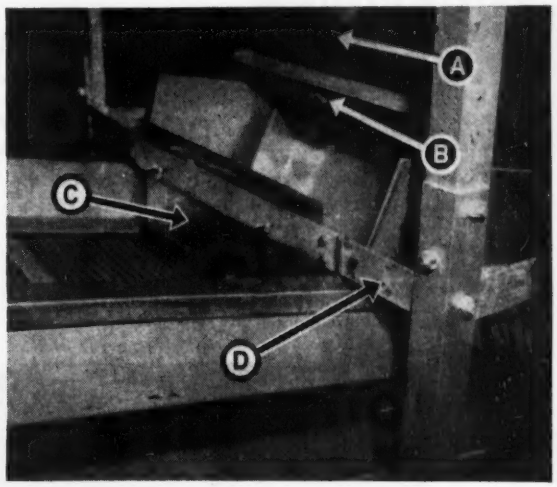
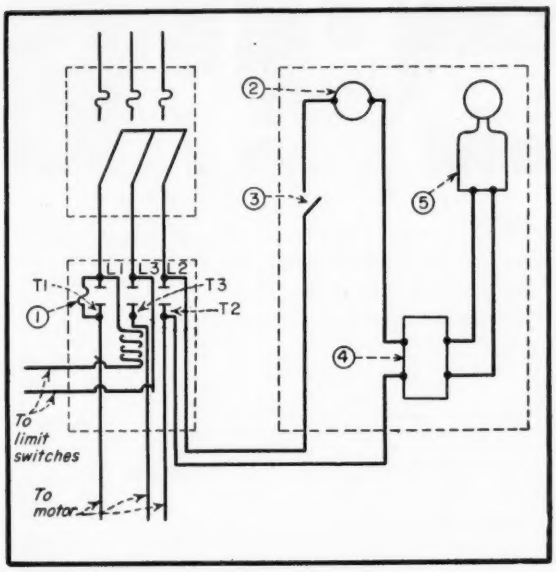
PRACTICAL IDEAS



Conveyor Feed Made Uniform

By adding three attachments to the hoppers which supply French fried potatoes to our packaging line feed conveyors, we are now assured a uniform supply at the filling stations.

One addition was a vibrator (see left photo) to prevent product arching or clogging in the tapered hopper outlet. Next an adjustable slide—(A) in right photo—was provided at the hopper outlet. Thus, size of discharge outlet can be regulated merely by the adjustment of a wing nut (B). Lastly, another adjustable slide (C) was attached to an iron strap (D) suspended above conveyor. This slide can also be raised or lowered by manipulation of wing nuts to thus determine the depth of the layer of French fried potatoes on the conveyor and also to spread the product evenly across the width of the belt.—*Keigo Inowye, Design Engineer, Seabrook Farms Co., Bridgeton, N. J.*



Warns of Conveyor Stops

Here is a simple and economical signal system we employ to warn when limit switches or overloads have stopped the motor driving our case conveyor lift.

The motor rating is ½ hp., 208v., 3 phase, and it is wired through a conventional safety switch and magnetic starter.

Connected between L1 and T1 on the magnetic starter is a 3 ampere fuse—(1) in sketch. A 120 volt-40 watt lamp (2) is wired in series with snap switch (3) and an 8v. transformer unit (4) (which has a 120v. primary) between L2 and T2. A 6-8 volt bell (5) is connected to the transformer.

Rather than a jumper, a fuse is used to provide protection against single phasing in case a short circuit should occur between L2 and T2. The current drawn by the light, bell and transformer is negligible in its effect upon the motor windings.

When a stoppage occurs in the flow of cases along the conveyor, limit switches there break the circuit to the holding coil of the starter, thereby stopping motor and permitting current to flow through the alarm circuit.

A 120v. transformer and 120v. lamp are used in series because in this way, when the bell rings, a fluctuation is created in the circuit making light blink, thereby making the alarm more effective.

The snap switch is to cut off the alarm when it is undesirable. Need of a relay and its installation costs are thus eliminated.—*A. J. Morgan, Jr., Norfolk Coca-Cola Bottling Works, Inc., Norfolk, Va.*

Removes Collision Hazard

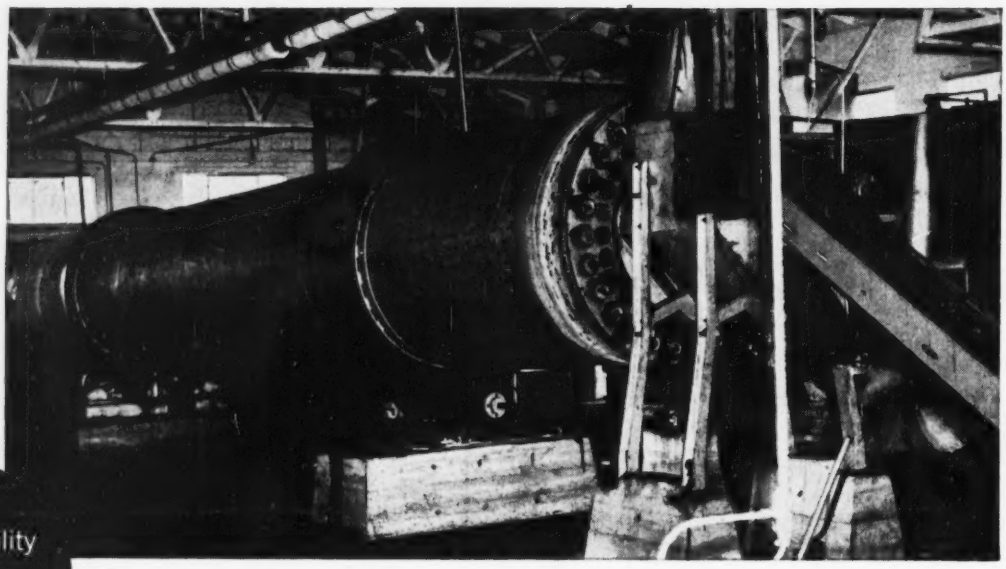
Where industrial power trucks operate up and down intersecting aisles in a factory, a serious collision hazard exists. But this hazard has been completely removed in one factory by blinker-type traffic lights, mounted overhead at the center of the intersections.

When a heavy-traffic main aisle crosses an aisle with light traffic, the light flashes red to truck operators approaching the intersection on the latter aisle, bringing them to a dead stop before proceeding across the intersection. Truck drivers on the main aisle get a yellow caution signal to make them proceed carefully, but without stopping.

When two main aisles intersect, the light flashes red

Louisville method doubles your cooking capacity—

cuts your costs in half



for dependability see General American

creative engineering design construction installation

A single Louisville Steam Tube Dryer has doubled the efficiency of this modern rendering plant*. It now discharges the offal from several "batch" cookers in less than half the normal cooking and drying time.

The Louisville method has also helped this plant reduce its unit cost and increase its efficiency in these ways:

- Less total electricity required.
- Motor maintenance and replacement reduced.
- Less total steam required.
- Less maintenance and increased life for "batch cookers" by discharging the material before it becomes gluey and abrasive.
- Same labor handles additional capacity.
- Stack odors slight and easily controlled if necessary.
- Operates efficiently on all kinds of offal, blood, cracklings, steep water and manure.

Let us send an engineer to help you make these savings, too.

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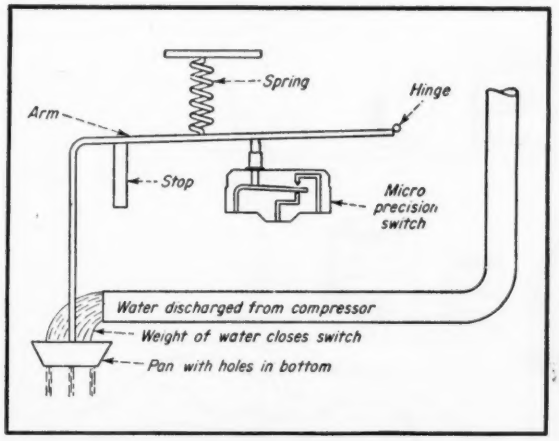
in all four directions. Here, a truck operator approaching the intersection from any direction must stop his vehicle before entering the intersection.

In the plant in question, no truck collisions have occurred since the traffic lights were installed.



Protects Water-Cooled Compressor

It is a simple matter to arrange a control system which will prevent starting a water-cooled compressor at any time the water is not flowing through the jacket.

Just below the water discharge pipe from the compressor, suspend a perforated pan from a spring supported arm that rests on the plunger of a normally open snap-action switch. The weight of water in the pan keeps the holding circuit closed. Should the water supply fail, the pan drains, thus opening the switch and shutting off the compressor.—*Microswitch Div. of Minneapolis-Honeywell Regulator Co., Freeport, Ill.*

Safety Stopper for Trucks

When industrial power trucks must cross walkways used by employes in food factories, or their premises, there is the hazard that someone will be knocked down by a truck. But the picture above illustrates a simple and foolproof means for stopping trucks at walkway crossings.

The trucks are routed between a pair of board fences on either side of the path they are to follow across the walkway, and openings in the fences permit people to pass through them along the walkway. Then a piece of steel pipe 4 ft. long and 6 in. in diameter is imbedded to slightly more than half its diameter in the truck roadway at each end of the fenced-in passage.

With this arrangement, the truck operator must stop his vehicle at the pipe as he approaches the crosswalk, otherwise the bump would severely jolt him and his load. So he has plenty of time to see a worker who is approaching the crossing.

The two imbedded pipes are needed because trucks usually operate in both directions across the walkway. So the truck is also forced to stop as it emerges from the fenced-in passageway, that being the situation in the picture.—*Donald Wente, Mechanical Engineer, Purdue University, Lafayette, Ind.*

Simple Graphic Panel

In a process involving a series of operations, it is helpful to the man in charge to visualize at a glance what is going on anywhere at any given time. For this he needs some type of schematic diagram of the process, with operation indicators superimposed upon it.

Big graphic instrument panels are an ideal answer to this need. But a simple, inexpensive, temporary substitute was conceived by engineers of W. F. & John Barnes and The Girdler Co. for pilot plant operation of a push-button operated, sequence-controlled Girdler high temperature, short-time sterilizing process and Martin aseptic canning system.

A 30 x 30 in. flow-sheet type drawing of the system was placed behind glass in a 4 in. deep cabinet mounted on the top, back side of the pushbutton console. And small electric light bulbs were placed behind key parts of the system on the drawing. Then each of these lights was wired into the circuit for the unit with which it was associated on the drawing, so that it illuminated the drawing at the proper point when that unit was in operation.

With this graphic panel, it was easy for the operator to determine whether all units involved in a particular cycle

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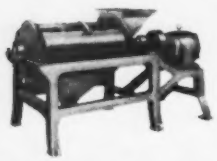
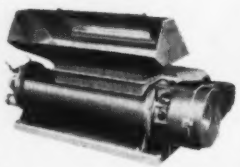
If you pack any tomato products, you are probably operating some of the FMC tomato equipment described here. For there is an FMC *Specialized* item for practically every stage in the preparation and processing of tomatoes and all tomato products. Each is engineered and built to meet the most exacting requirements, and to deliver highest quality products at lowest operating, maintenance and replacement costs. For the best in equipment for every tomato product, specify FMC—your key to Food Equipment.

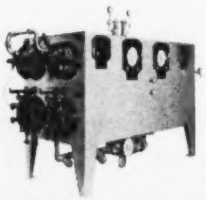


FMC Pulpers and Finishers—Heavy duty frame, rigid construction. High capacities: Pulpers 5 to 20 tons per hr. Finishers 20 to 100 GPM.



FMC Tomato Chopper—Delivers small uniformly chopped product at 25 tons per hr. Table-level feed height eliminates feed elevators.

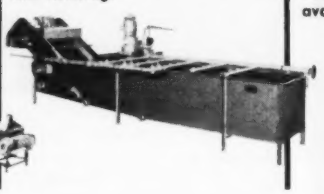
FMC Hand Pack Filler—Sturdy stainless top. Constant or variable speed drive. Sets the pace for your tomato line.



FMC Juice Processor—Continuous preheating, pasteurizing, holding and cooling in one machine. Capacities: 20-70 GPM. 1, 2 and 3-Unit Processors also available.

FMC Tomato Lines—Thorough washing, sorting and scalding on a continuous conveyor. Available in high or low pressure water systems.

FMC Flood Washer—Provides a gentle yet thorough washing action through low pressure spraying and flooding.



FMC Juice Extractors—Large screen area, extra long screen and extraction area for capacities up to 75 GPM. Lower capacity models available.

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- Heating coils and stainless steel tanks
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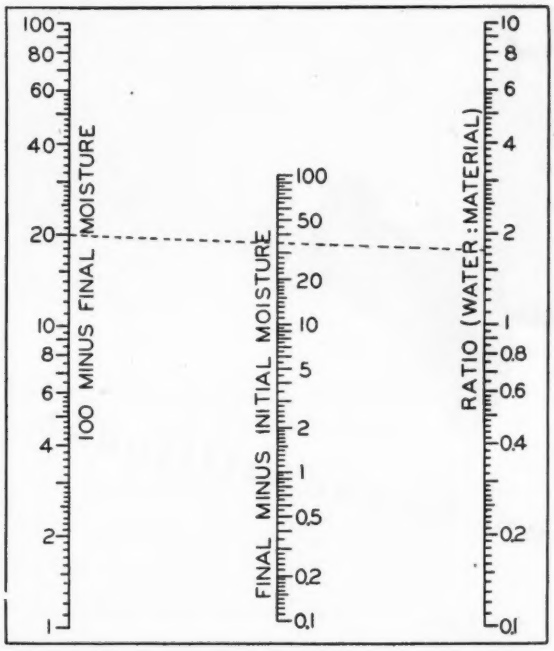
of aseptic canning were functioning. Or in case of trouble, a nonfunctioning unit could be quickly spotted on the drawing.—*FE Staff.*



Moisture Control Method

In chemical and food processing it is frequently necessary to adjust the moisture content of a material or solution to a desired value by the addition to, or evaporation of water from, a material or solution being processed.

As an example of the use of this chart, suppose that a material of 45 per cent moisture content is to be processed at 80 per cent moisture content; how much water should be added?

A straight edge, connecting 20 on the left scale with 35 on the middle scale, intersects the right scale at 1.75. Therefore, the ratio of water to material of 45 per cent moisture content is 1.75. Multiplying the weight of material of 45 per cent moisture content by 1.75 gives the weight of water to be added.

By reversing this procedure the nomograph can be employed to determine the weight of water to be evaporated in order to concentrate a given solution or material. —*Thomas T. Hogan, New Orleans.*

"PLEASE" Keeps Plant Tidy

Today, enlightened management is getting workers to do what it wants by educating them to the importance and advantages of doing things in a certain way. Then the worker's own judgment directs his activities along the right course.

With workers mentally conditioned in this way, management can get results by suggestion and appeal.

In one factory where management takes this approach in employee relations, the plant areas are kept tidy by a very simple device. The single word "PLEASE" is lettered across the waste cans in big letters—in red against the white sides of the cans.

The appeal is subtle, yet forceful. And it gets much better cooperation than would a dictatorial sign, such as "Throw Waste Here."

$50 Extra for Best Item

You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed and if it is judged best for the month, you will get an additional payment of $50.

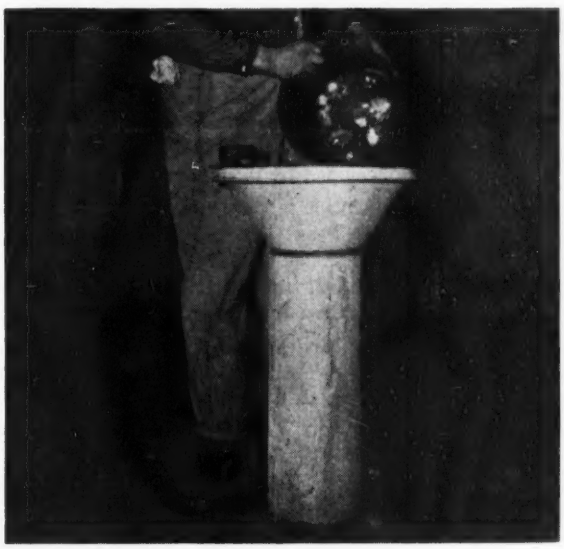
Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

FEBRUARY PRACTICAL IDEA winner was "Ends Bacteria Build-Up", submitted by Belford L. Seabrook, Chief Engineer, Seabrook Farms Co., Bridgeton, N. J. Described was rapid lowering of cooked-squash temperature preparatory to freezing, thus preventing bacteria growth. From cooker, squash advances by screw through jacketed tubes cooled by —40 deg. brine.



Simple Broken-Bottle Disposer

Formerly, disposal of broken glass containers from our second-floor bottling department involved carrying them downstairs to trash containers—a distance of several hundred feet.

Now, we've devised a simple disposal system that's eliminated the time, labor, and distance required to dispose of the "brokens." It involves a removable 2 ft. dia. metal funnel that's mounted on a 6 in. dia. pipe. The pipe extends about 2 ft. above the floor and chutes the broken glass directly into disposal receptacles on the floor below.—*Hugh B. Wright, Superintendent of Maintenance, Refined Syrups & Sugars, Inc., Yonkers, N. Y.*

PNEUMATIC makes them by the millions!

There probably would be no such thing as tea bags for the table, if it were not for a unique machine which originated in the minds of Pneumatic engineers . . . and was designed and developed by the Pneumatic organization.

This Pneumatic invention made the tea bag idea practical, on a production basis. Today it is working for other leading tea packers, as it does for LIPTON — bagging and tagging the "brisk" LIPTON blend at better than 165 per minute, hours on end!

From the earliest days of automatic packaging Pneumatic has met the rapidly changing and expanding needs of mass production packaging with soundly conceived and engineered equipment designed to operate at "lower cost per container."

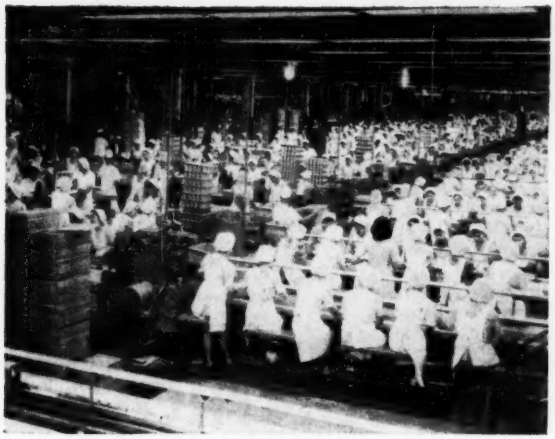
Certainly, Pneumatic's vast experience, hard earned skill and high reputation command your attention when you're talking of investing in modern packaging or bottling equipment.

PNEUMATIC SCALE CORP., LTD., 91 Newport Ave., Quincy 71, Mass. *Also: New York; Chicago; San Francisco; Los Angeles; Seattle; Leeds, England.*

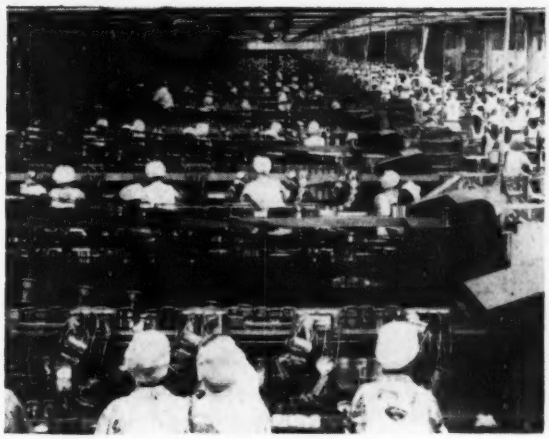
Pneumatic Heat Seal Tea Bag Makers and Tagging Units in operation at Lipton's modern plant in Galveston, Texas. Various other Lipton plants use similar equipment.

★ PNEUMATIC

Packaging and Bottling Equipment



OLD



NEW

Three Materials Handling Changes Save Time and Labor on Cans

Recent improvements in methods of handling both empty and filled cans at Hawaiian Pineapple Company, Honolulu, have reduced the number of hand packers (left photo) required for can filling to a much smaller number (right photo), thereby increasing output per worker.

1. Cans Now Arrive Mechanically

Formerly, though cans were conveyed from the can factory, they were manually loaded from bins to gravity shoots for each packing table. Now, cans are conveyed to four central distribution systems. To give continuity and flexibility to this operation, each conveyor system has a number of revolving metal accumulator discs (see photo). Now empty containers can accumulate until there is room for them to move on to the gravity shoots to the packing tables. When the system is filled, cans may be diverted to storage areas and from there returned when more cans are needed. This part of the system provides centralized control, greater efficiency, more ease of handling and reduced man power requirements.

2. Belt Shakes Them Off

Delivery of cans from conveyor system into the packer's hands proved more difficult than might appear at first glance. The problem was how to get the cans to drop out in sufficient volume at each location where one of the ten packing girls was stationed.

The solution was obtained through designing a conveyor belt that dances. Cans come off the gravity shoot and on to a belt traveling along the top of the packing table. Belt alternately moves twice forward and then once back. The resulting jiggling conveniently log-jams the cans and forces them out the sides of the track into the individual packing positions through a chute made of $\frac{5}{16}$ in. stainless steel wire (see photo).

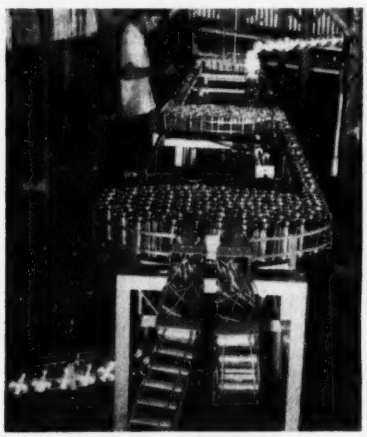
3. Accumulator Keeps Supply Uniform

Some filled cans from hand packing stations are diverted by take-off discs to machines which automatically empty can contents and repack it into special sizes such as 1 flats, $1\frac{1}{4}$'s, and others. Repacking these smaller can sizes is more economical than setting up special lines to pack them directly. Repacking is mechanical with no manual rehandling of the fruit.

Product in #2 cans is conveyed to one end of the floor to syrup and sealing machines, #$2\frac{1}{2}$ cans to similar machines at the opposite end.

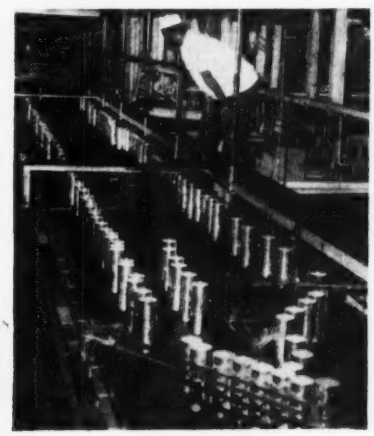
These six lines feed into two continuous-belt reservoirs, one located at each end of the cannery. These belts accumulate cans and feed them into the syrup and closing machines at the right pace. Each belt reservoir consists of two 80 ft. long rubber-covered belts, each 24 in. wide and $\frac{1}{2}$ in. thick.

Belts adjoin each other, but move in opposite directions.



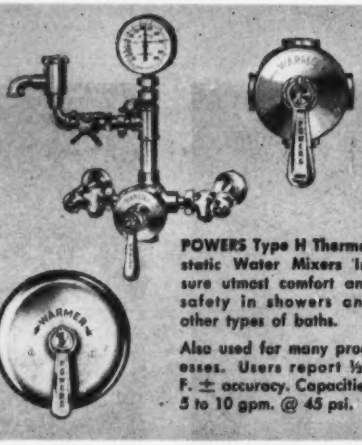
1—Ready to distribute

2—Belt delivery



3—Supply balanced

Above: POWERS ACCRITEM Temperature Regulator, is water or compressed air operated. Controls FLOWRITE diaphragm valve (right). Widely used for Water Heaters and Industrial Processes.

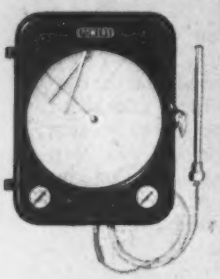


POWERS Type H Thermostatic Water Mixers Insure utmost comfort and safety in showers and other types of baths.

Also used for many processes. Users report ½° F. ± accuracy. Capacities 5 to 10 gpm. @ 45 psi.

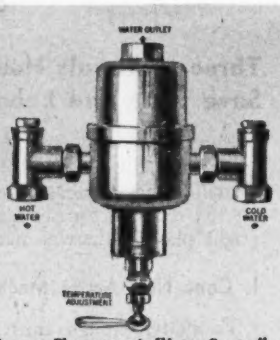
Powers No. 11 Self-Operating Regulator widely used for water storage heaters, heat exchangers, fuel oil preheaters and many industrial processes.

WATER Temperature CONTROL?

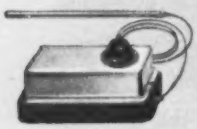


Powers Series 100 Recording Controller. Compressed Air Operated.

POWERS FLOWRITE V-Port-Characterized Diaphragm Control Valve.



Powers Thermostatic Water Controller for regulating temperature of mulitple type showers, hydro-therapy and industrial processes. Capacities 22 to 125 gpm. @ 45 psi.



Powers Remote Bulb Type D Thermostat for Unit Air Conditioners.

POWERS PACKLESS VALVES

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No leakage
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Our More than 60 Years Experience will be valuable in helping you select the right control for your requirements. Contact our nearest office or *Write us direct for Condensed Catalog Rb 24.*

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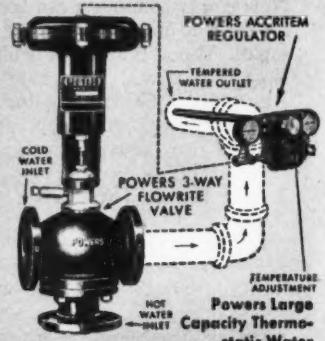
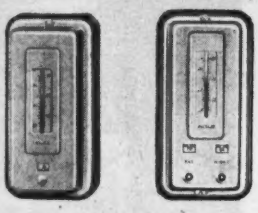


Powers Large Capacity Thermostatic Water Mixing Valve Controlled by an ACCRITEM Temperature Regulator. Capacities 20 to 1200 gpm. @ 45 psi.

Powers MASTROL Control for regulating forced hot water heating systems.



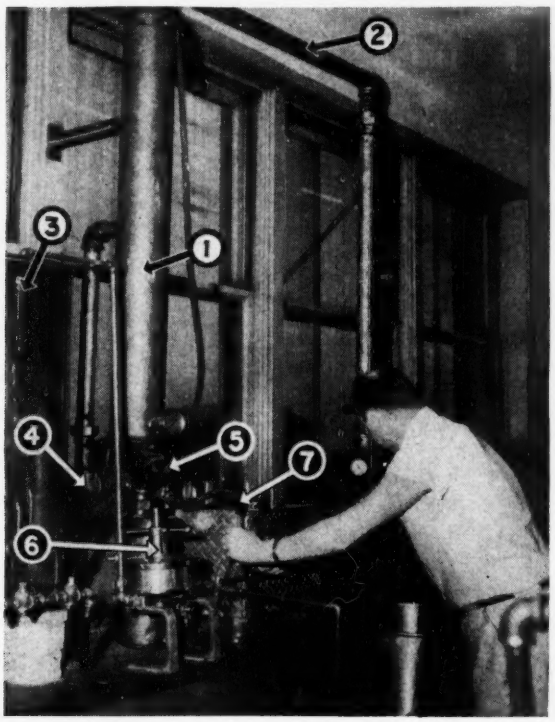
Powers Room Type Pneumatic Controls for Radiant Heating-Cooling Panels, Convectors and Unit Ventilators. Valves are packless. No more packing maintenance. No leakage.

(b61)

Cans are diverted to the first belt moving in one direction. When containers reach the end of the belt's travel, deflector arms transfer them to the adjacent belt moving in the opposite direction.

Cans are taken off rapidly at any of the several deflector exits and move on gravity conveyors down to the syruping, closing or packing machines. Or, they can go round and round and accumulate to a considerable depth on the belts if necessary. An operator controls this flow by shifting the deflectors. He also can arrange the deflectors to handle fancy fruit at one end of the belts and choice fruit pack at another.

Any proportion of the belt can be blocked off, thus making the system adjustable to the type of fruit running in the greatest volume and feeding the closing machines accordingly.—*FE Staff.*



Homemade Lab-Size Evaporator

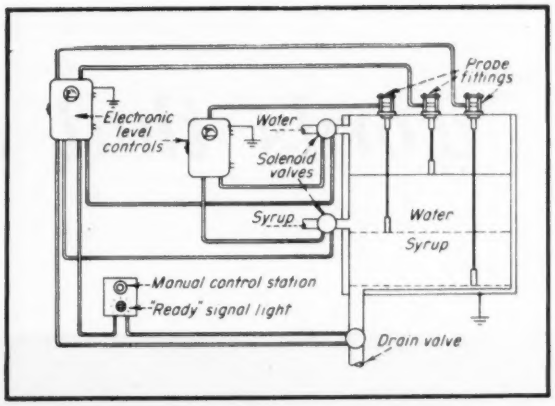
A simple concentrator we built from stock parts has enabled us to make up sample-size batches—from 5 to 100 gal.—of new liquid sugar products for customer-test purposes. And we can now prepare these products without interrupting our refinery operations.

Capacity of this pilot plant-size evaporator is about 5 gal. per hr. However, it varies with the concentration of the product.

The concentrator (1) is made of a stainless steel pipe ($\frac{1}{2}$ x 4$\frac{1}{2}$ ft.), with a 2 in. galvanized pipe (2) to withdraw the water vapor which condenses in the long pipe and is discharged into a drain.

Liquid sugar to be concentrated is fed from a stainless supply tank (3), past a valve and temperature gage, through a steam-type, Heliflow heat-exchanger (4), past another temperature gage, and into the evaporator.

Flow is regulated by valve (5) as concentrated syrup discharges into $\frac{1}{2}$ x 1$\frac{1}{2}$ ft. stainless receiving vessel (6). Vacuum hose (7) is hooked up to receiving vessel.—*E. D. Gillette, Chief Chemist, Refined Syrups & Sugars, Inc., Yonkers, N. Y.*



Accurate Ingredient Proportioning

For preparing two ingredient solutions such as may be required in processing jams and jellies, or for makeup of syrups used in fruit and vegetable processing, an electronic control system can assure continuous automatic results.

This is how the automatic flexible sanitary control system may be installed.

Three probe rods (see sketch) are projected into the make-up tank at specific levels. The lowest probe rod is fixed near the bottom of the tank for drain shut-off of syrup or other solution turn-on control, while the other two rods are adjustable to the levels required by the jam, jelly or solution recipe. The upper of these two probe rods controls the water or other liquid shutoff, while the lower rod controls the syrup or primary solution shut-off and also water turn-on.

The system operates in this manner.

Initially, the drain is closed and the syrup is turned on. As the syrup volume rises, the liquid contacts the middle probe rod, shutting off the syrup supply and turning on the water supply.

When the combined liquids contact the upper probe rod the water is shut off. At the same time an indicating alarm system signals the operator that the mixture is now ready for use.

Thereupon, operation of a pushbutton drains the mixture from the preparation tank. When the drain shut-off probe rod is uncovered the drain valve closes and the filling cycle is repeated.

Fixed amounts of two ingredients can be automatically measured out to make up a specific mixture which is then automatically metered into the process.—*Photoswitch, Inc., Cambridge, Mass.*

Bandsaw Cuts Metal

Metal cutting can be very rapid with conventional band saws operating at speeds of 3,000 to 10,000 fpm. Practically any metal can be cut in thicknesses up to about $\frac{3}{4}$ in.

Although specially designed machines are available, usually the ordinary large type woodworking bandsaw is adequate.

It is well to check with the manufacturer, however, to determine the safe limits of operating speed. One user has found saws made of ordinary steel strapping, without teeth, worked very satisfactorily at high speeds. When sawing ferrous metal, the cut proceeds with a shower of sparks similar to that with an emery wheel.—*"General Foods Technical Bulletin," General Foods Corp., New York City.*

words that speak of action!

Here are examples of the way Pfizer products are now being used to cut processing

Packers can cut smokehouse time of cooked, cured, comminuted meats by ⅓ or more with Pfizer Ascorbic Acid or Sodium Ascorbate. In many instances these products give better color retention. They are easy to use . . . simply dissolved in water and added near the end of the chop. Inexpensive, too . . . averaging approximately a quarter-cent for each pound of finished product.

A smoother, creamier tasting product is the result of emulsifying process cheeses with Pfizer Sodium Citrate. This pleasant-tasting salt of citric acid improves the slicing characteristics . . . makes process cheeses non-crumbling and uniform. It serves ideally, too, for cheeses that are to be remelted in cooking, making possible the smooth, even quality all cooks desire.

It takes only a few words to get action

when you're dealing with your Pfizer sales representative

Suppose, for instance, you are seeking advice on giving one of your present food products more sales appeal. Or, you may be considering the production of a new or improved product. On the other hand, you may be finding that excessive processing costs are threatening to price your line out of the market. Whatever your problem, discuss it with your Pfizer sales representative. He may find the answer in the vast experience Pfizer has gained in working with the food processing industry for nearly a century.

costs or to add sales appeal to foods and beverages.

Carbonated beverages enriched with Vitamin B_1 and Vitamin C have already proved to be big sales getters. Additional experimental work . . . fortifying beverages with Vitamin B_{12} is now being carried on. Vitamin-fortified carbonated beverages may be *your* next sales success. Contact Pfizer for information accumulated in more than 17 years as a leading vitamin manufacturer.

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- √ Sliding door inside body behind wheelhouses seals off vestibule compartment 51 inches long for unloading.

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LINK-BELT's P.I.V. provides positive, infinitely variable speed selection

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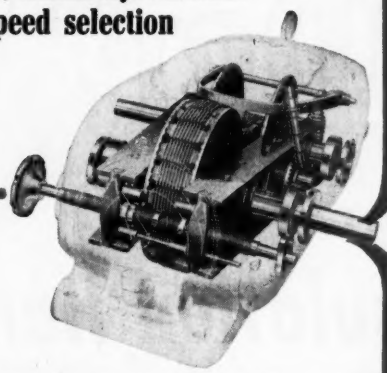

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WHEREVER speeds must be varied—instantly, exactly, positively—you'll find Link-Belt's P.I.V. at work. Here's a variable speed drive that operates independent of friction. Exclusive self-tooth-forming chain meshes with grooved wheels, transmits power with no wasteful slip.

Without stopping the machine, you can select the speed you need—from maximum to minimum settings. And at any speed, full-rated horsepower is delivered.

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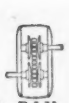
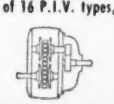
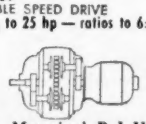
4 of 16 P.I.V. types, ½ to 25 hp — ratios to 6:1



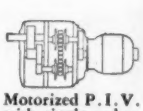
Basic P.I.V. Like all others, it is built for horizontal or vertical mounting.



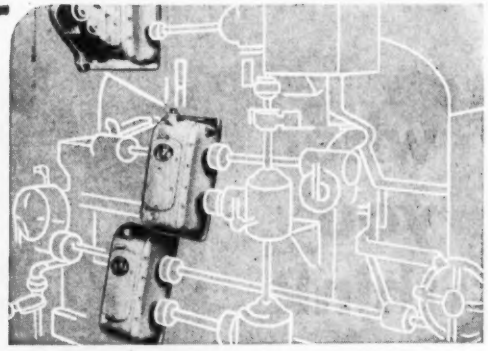
P.I.V. with single reduction input or output helical gears.



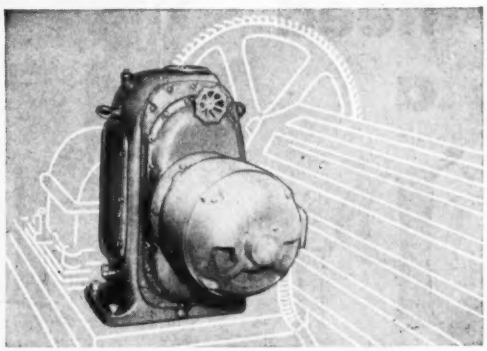
Motorized P.I.V. with single reduction input and output helical gears.



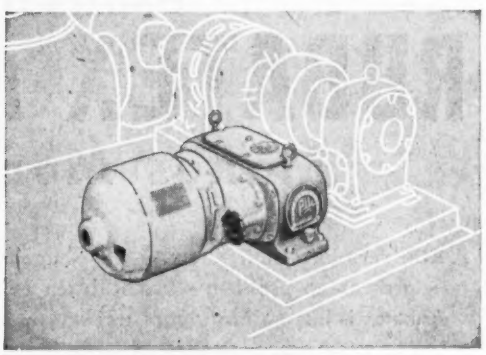
Motorized P.I.V. with single reduction input and double reduction output helical gears.



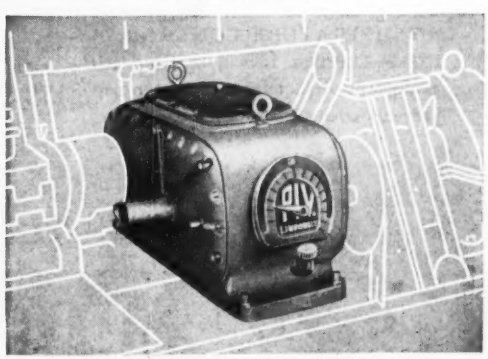
POSITIVE OPERATION OF DIFFERENTIAL SPEED EQUIPMENT. P.I.V. also provides precise regulation of rotary motion.



FLEXIBILITY IN TIMING. In addition, P.I.V. offers accurate control of processing speeds, unaffected by atmospheric conditions.



STEPLESS CONTROL OF PRODUCTION LINES OR INDIVIDUAL MACHINES, either manually or automatically, positively, dependably.



EXACT SYNCHRONIZATION OF ROTATING PARTS AND MACHINES. P.I.V. is needed where automatic sequence control must be stepless.

For more information, use coupon on page 175.

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The Liquid Carbonic Corp.
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NATIONAL CAN

PACKAGING FOR . . .

. . . most everything in Mrs. Housewife's cupboard! To list the many products used in the kitchen alone would take several pages—for NC has pioneered — developed and manufactured packaging for a host of products. NC's team of production expert, research chemist, agronomist and merchandising counsel have been of inestimable aid in these projects. A call or wire puts them to work on your problems — no obligation, of course.

NC

NATIONAL CAN

CORPORATION

Plants At: BALTIMORE, MD. • CHICAGO, ILL. • MASPETH, N.Y.
CLEVELAND, OHIO • HAMILTON, OHIO and WARREN, OHIO

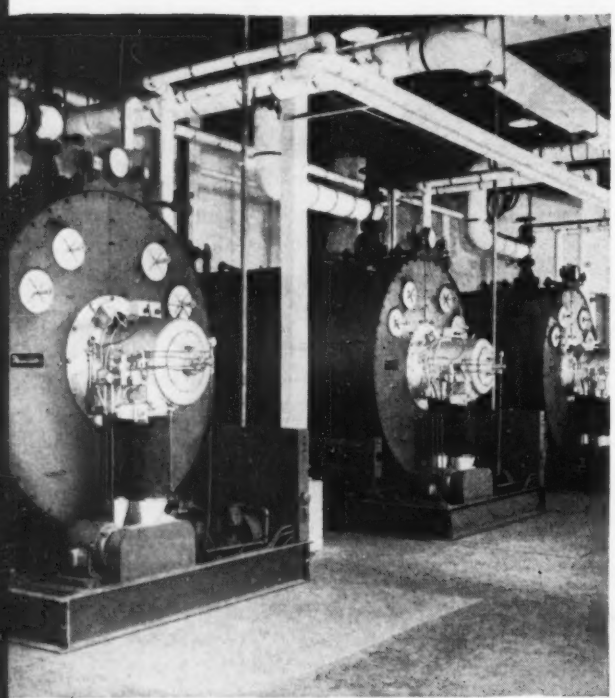
NC

For more information, use coupon on page 175.

New.. Powermaster®

exclusive.....

Now . . . for the *first time* you can get packaged boiler units in the wide range of capacities from 15 to 500 HP, with *complete interchangeability of fuels* . . . light or heavy fuel oil—natural or manufactured gas—or combination gas and oil . . . and you get this cost-saving advantage *only* with *Powermaster* Packaged Automatic Boilers. Find out more about this new, wide-range service today from your *Powermaster* representative. He will help you with recommendations and suggestions for selecting the most economical units to supply steam or hot water requirements in any kind of service—industrial plants, institutions, public buildings, schools, laundries, apartment houses, hospitals, dairies, motels, and shopping centers.



- Complete Fuel Flexibility:
  Light or Heavy Oil, Any Gas or Combination Oil and Gas
- Choice of:
  Air Atomizing VORIFLOW Oil Burner —Pre-Mix VORIFLOW Gas Burner— Combination VORIFLOW Oil and Gas Burner—All Designed and Built by O & S.
- Full-Range Modulation with VORIFLOW Combustion.
- All Middle-Range and Large Capacities.
- Selection of Automatic Operating and Safety Controls.
- Instant Change from Fuel to Fuel.

Model 3 *Powermaster*—Experienced-proved to be the standard of industry. These three 350 HP units are supplying process steam at pressures up to 200 psi.

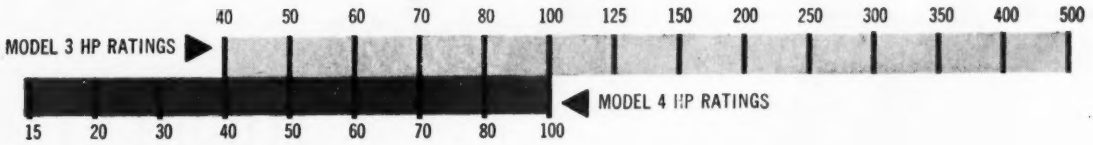
Send for bulletins describing Model 3 and Model 4 *Powermaster* units.

ORR & SEMBOWER, INC.
READING, PA.
BUILDING DEPENDABLE BOILERS SINCE 1885

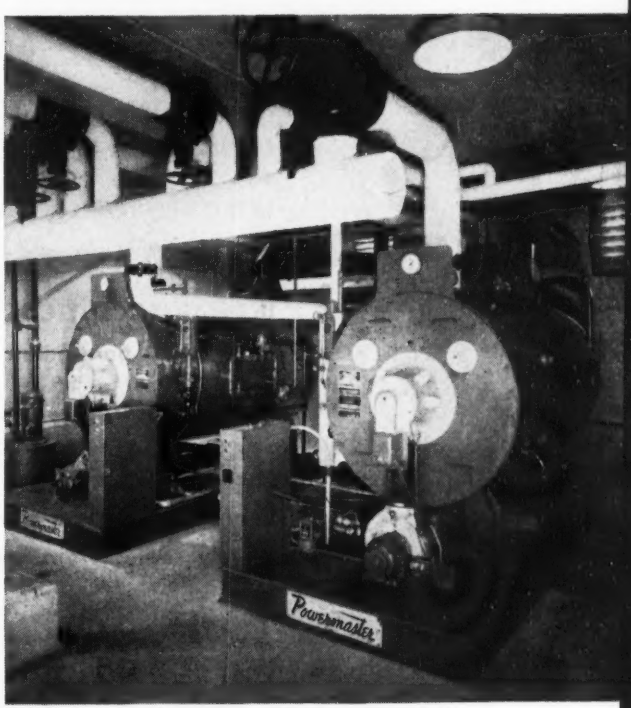
. . a choice of 2

Powermaster Packaged Automatic Boilers to meet your specific operating requirements . . . to your best advantage.

for 15 to 250 psi. steam or hot water



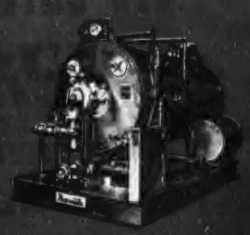
- Choice of Fuels:
  Light Distillate—Natural Gas—Manufactured Gas—Combination Oil and Gas.
- Choice of:
  Mechanical Pressure Atomizing Oil Burner—Pre-Mix Gas Burner—Combination Oil and Gas Burner—All Designed and Built by O & S.
- On-Off and Low-Fire Start Burners.
- Small and Popular Middle-Range Capacities.
- Selection of Automatic Operating and Safety Controls.
- Quick Change from Fuel to Fuel.



Model 4 *Powermaster*—Already service-proved in wide variety of successful applications. This installation of 40 HP units supplies 15 psi. steam for heating.

Powermaster®

PACKAGED AUTOMATIC BOILERS



It's almost unbelievable!

Sealva FLAVORS!

The New Hermetically Sealed are showing some remarkable performances.

In GELATIN DESSERTS, Sealva Lime flavor far outlasts other protected flavors in extended shelf tests.

In BOXED CHOCOLATES, Sealva flavored mints maintain their original strength and do not permeate other confections.

In PHARMACEUTICALS, Sealva Orange has done the impossible in a pleasant permanent taste mask in powders and tablets.

Sealva fruit flavors have made possible revolutionary new products in PREPARED MIXES and DESSERTS.

Sealva flavors are dry powders. Each droplet of flavor oil is completely sealed from the atmosphere with an edible protective film.

VAN AMERINGEN-HAEBLER, INC.
521 West 57th Street
New York 19, N. Y.

Alva FLAVORS

For more information, use coupon on page 175.

B. F. Goodrich announces

No need to scour this belt— it's Koroseal, and washes like glass

JUST a quick wipe with a damp cloth, and the belt on that icing table will be as clean as glass. That's because it's Koroseal, one of the new conveyor belts just developed by B. F. Goodrich for food handling.

Belts made of Koroseal flexible material have a smooth, polished surface. It's so tough that food particles can't grind into it. Sticky icing, jelly, most stains come off with a damp cloth. Or you can use detergents and water as often as you wish. Either way, cleaning time is cut in half. Since Koroseal is completely, permanently waterproof, the belt cover never gets damp or soggy, and so can be used right after washing.

Koroseal resists cracking and peeling, doesn't get sticky. And there's no danger of contamination with Koroseal because it is nontoxic, and has no odor or taste to transfer to foods. With its high resistance to cooking oil, animal fats, and most acids, the new Koroseal belt is ideal for bakeries as well as places where meats, nuts, greasy pans are handled.

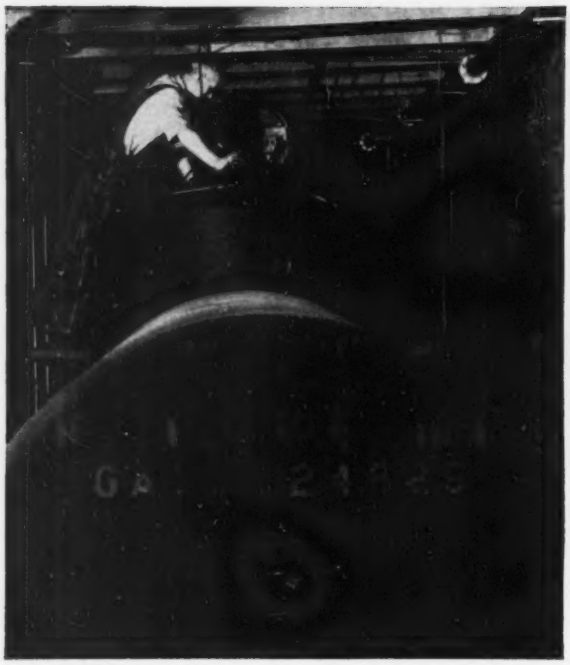
Some of the other new belts, developed by B. F. Goodrich for food handling, include a very thin, white Koroseal belt for use in cooling tunnels, and two belts, called Highseal and Kleenseal, that are made of new types of rubber compounds. Their "sight-saving" green color reduces glare and eye strain on packaging and inspection lines.

It will pay you to find out more about these work-saving, money-saving improvements in food handling. First step is to have your BFG distributor survey your belting needs and recommend the right B. F. Goodrich belt for your process. If you don't know the distributor nearest you, write us and we'll send his name. *The B. F. Goodrich Company, Dept. M-208, Akron 18, Ohio.*

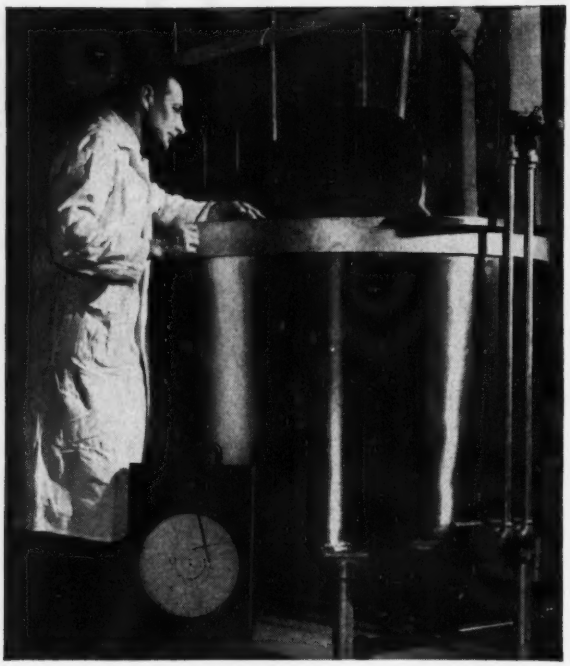
Koroseal—T. M. Reg. U. S. Pat. Off.

B.F. Goodrich
INDUSTRIAL PRODUCTS DIVISION

For more information, use coupon on page 175.



CONSTANT SYRUP CONSISTENCY *facilitates handling of raw materials, regardless of outdoor temperature. Steam coils in the tank car heat the received syrup, and a Brown thermometer automatically shuts off steam when proper temperature is reached.*



SPOT CHECKS *of marshmallow cooking kettles are easily made, by means of a portable Brown thermometer. The operator simply immerses the thermometer bulb in the kettle, allows a few seconds for the instrument to record temperature, and moves on to the next process.*

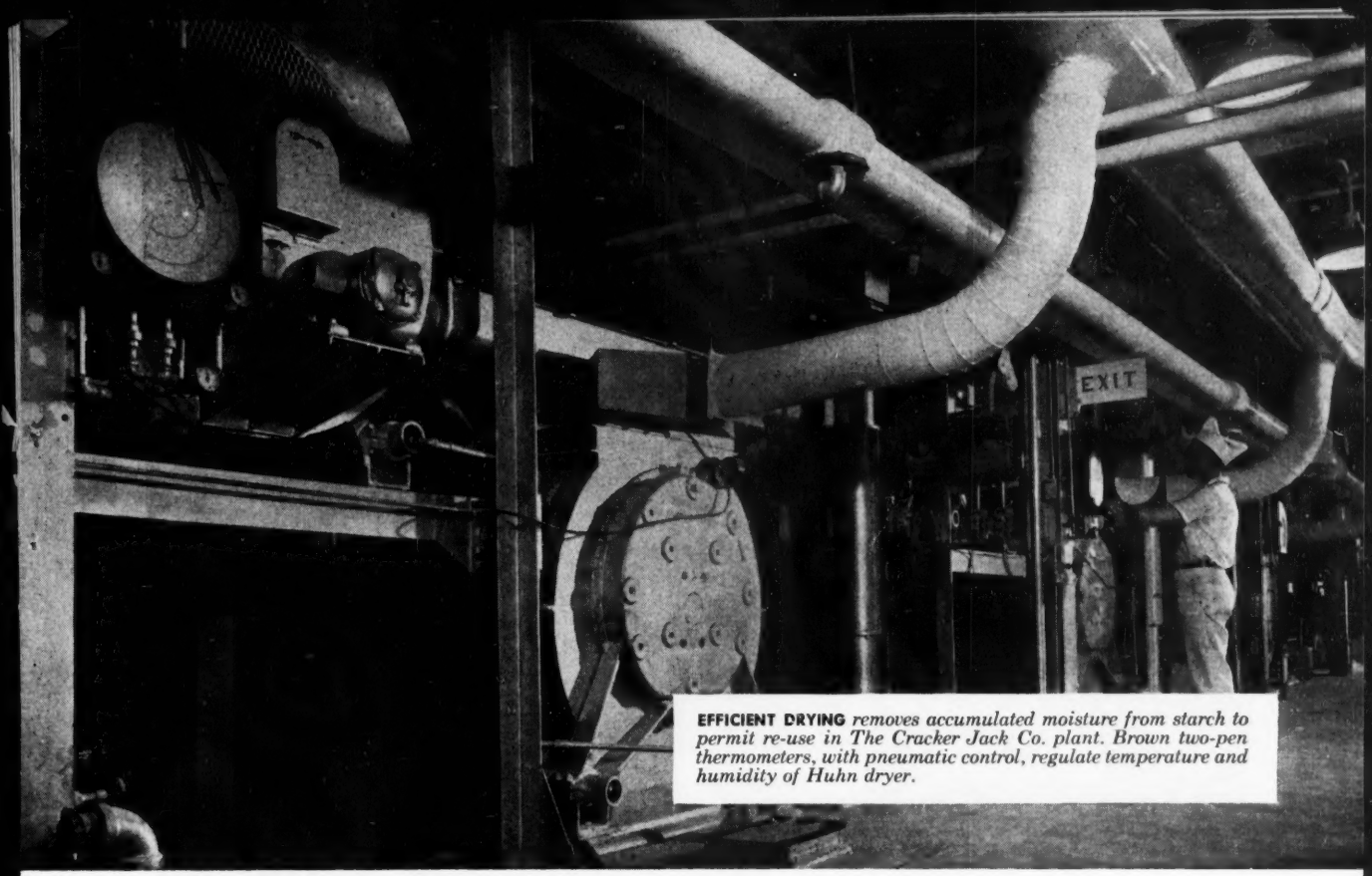
Critical temperatures *controlled by*

The inside story of Brown Thermometers

Thermometers use one of the best-known effects of heat—the expansion of a fluid. From this basic principle, an extensive family of Brown thermometers has developed. Especially valuable in the temperature range from −125 to +1000° F, these instruments have a thermal system consisting of a bulb connected by capillary tubing to a spiral. When temperature changes at the bulb, the fluid within it tends to expand or contract. The resulting changes in pressure in the sealed system cause the measuring spiral to wind or unwind, and thus to move the pen, pointer or control mechanism.

There are three basic types of thermal systems: mercury, gas and vapor-pressure. Mercury-filled systems are useful at higher temperatures. Gas-filled systems are most suitable for very low temperatures. Vapor-pressure systems, which contain both a volatile liquid and its vapor, are often recommended for narrow ranges. Various types of temperature compensation are built into the instrument, to eliminate the effects of changes in ambient temperature at the instrument, and changes in temperature along the capillary.

Because of their simple construction, Brown thermometers operate with an absolute minimum of routine attention. A wide selection of bulbs and fittings is available, including a wide range of types especially designed for the sanitary requirements of food processing.



EFFICIENT DRYING *removes accumulated moisture from starch to permit re-use in The Cracker Jack Co. plant. Brown two-pen thermometers, with pneumatic control, regulate temperature and humidity of Huhn dryer.*

in confectionery plant *versatile Brown thermometers*

AT SEVERAL different stages in the production of "Campfire" marshmallows, at The Cracker Jack Co. of Chicago, Brown thermometers measure and control temperatures essential to plant efficiency and product quality. They regulate the heating of syrup in tank cars . . . check the operation of cooking kettles . . . control drying of starch.

Practically any process that needs good temperature control can benefit by the use of Brown thermometers. Proved by years of usage throughout the food industry, these simple, rugged instruments afford features of precision, low maintenance and thoroughly dependable operation. They are available in many varied models: integral bulb, remote bulb, remote transmitters and receivers . . . with thermal systems that cover nearly every food processing application. Control systems include an extensive choice of electric and pneumatic forms . . . two-position, proportional, proportional-plus-reset, and fully automatic program control. The selection also covers multiple-pen instruments which combine related records of temperature, pressure and flow on a single chart.

From this wide line, Honeywell engineers with extensive experience in food process control can design thermometer instrumentation that exactly fits the requirements of your process. For a discussion of your specific application, call your nearby Honeywell sales engineer today . . . he's as near as your phone.

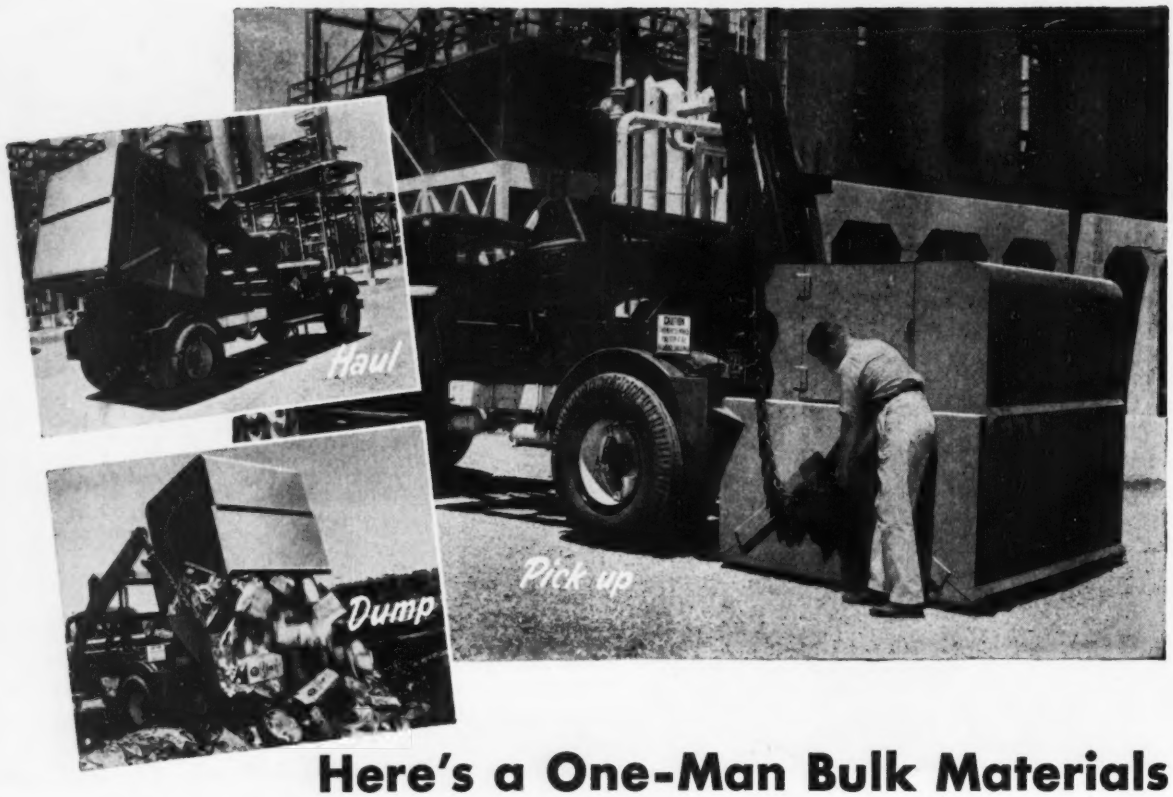
MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA:** Write for Catalog 6709, "Remote Bulb Thermometers."

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls



Here's a One-Man Bulk Materials Handling System for Your Plant...

In the Dempster-Dumpster System of bulk materials handling only one man, the driver of the truck-mounted Dempster-Dumpster, is required for operation. The Dempster-Dumpster serves scores of detachable Dempster-Dumpster Containers. Container capacities range up to 4 times that of conventional dump truck bodies and each container is designed to suit the materials to be handled—be they solids, liquids or dust . . . hot or cold . . . bulky, light or heavy. You simply place these containers at convenient materials accumulation points inside or outside buildings. When loaded each container is picked up, hauled and emptied (as shown above) or load set down intact. Entire operation is handled by hydraulic controls in cab.

Containers shown below are just a few of the many available or that can be built to meet your needs. They enable you to handle, at tremendous savings, materials of many descriptions—trash and waste materials, raw materials, finished products, etc. —with only one truck and only one man, the driver.

Without question, the Dempster-Dumpster System is the most economical and most efficient method of plant materials handling by truck ever devised!

Write to us for complete information. Manufactured exclusively by Dempster Brothers, Inc.

One Truck-Mounted
Dempster-Dumpster Handles Scores
of Containers... All Designs... All Sizes

DEMPSTER BROTHERS, 744 Shea Bldg., Knoxville 17, Tennessee

because they

Stand Up

for FOOD PACKING
for FOOD SHIPPING
for FOOD SELLING

Approved Packaging for:

Coffee—Ground
Coffee—Soluble
Tea
Sugar Confectionary
Sugar Brown
Chocolate Powder
Baking Mixes
Dessert Powders
Dried Eggs
Dried Milk
Cookies
Spice Compounds

Kard-O-Pak Pliofilm or Polyethylene-lined bags by AMERICAN will give you efficient packaging performance from point of packing to point of sale. Here is simplified packing with sealed-in protection against air, moisture, liquids, grease, or oil. Kard-O-Pak is a stand-out food seller with its self-opening stand-up base that stacks so neatly on the shelf, that assures dimensional stability with sales-winning showmanship. Kard-O-Pak bags by AMERICAN will give your food products sealed-in Vacuum Freshness at a considerable saving over conventional rigid containers. Now used on Gump, Consolidated, Fry, Benco and other equipment. Write today for the complete Kard-O-Pak story.

American Bag and Paper Corp.

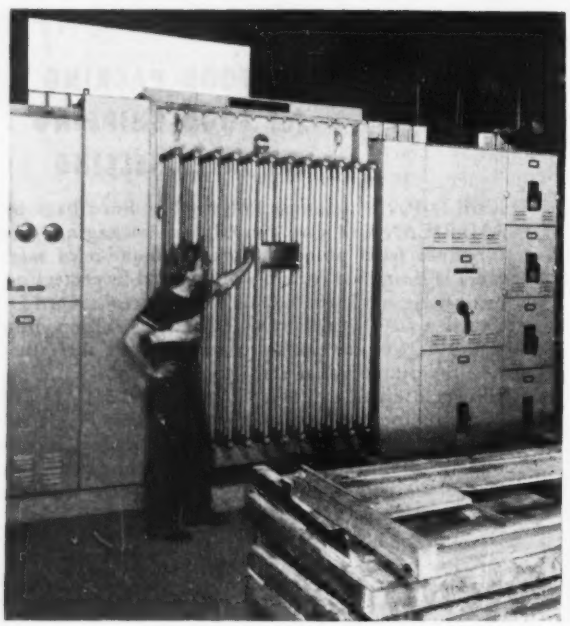
WATER and SOUTH STREETS • PHILA. 47, PA.

SELL WITH "ALL-AMERICAN" QUALITY

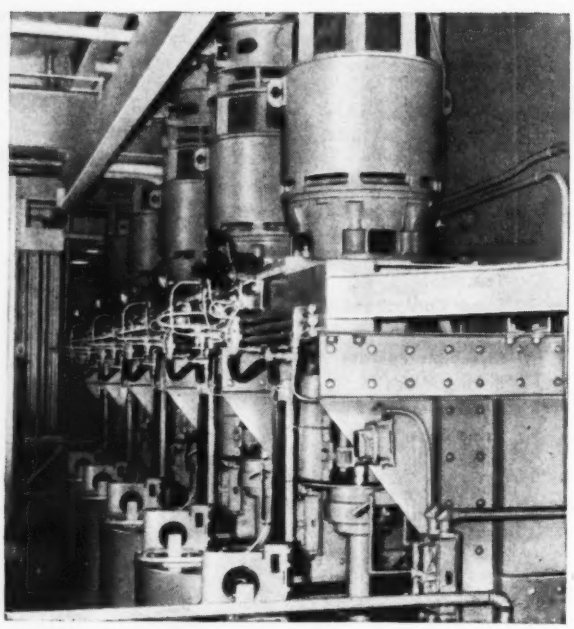
For more information, use coupon on page 175.

MASTER PLAN for National Sugar's new a-c power distribution system at Philadelphia was developed by this engineering team. Left to right: Frank LeCompte, Construction Engineer; Joseph Harrison, Electrical Engineer; Newton Smith, Plant Engineer; Lloyd Johnson, G-E Sales Engineer. Plan served as guide to flexible system that will simplify plant expansion.

Planned step-by-step modernization

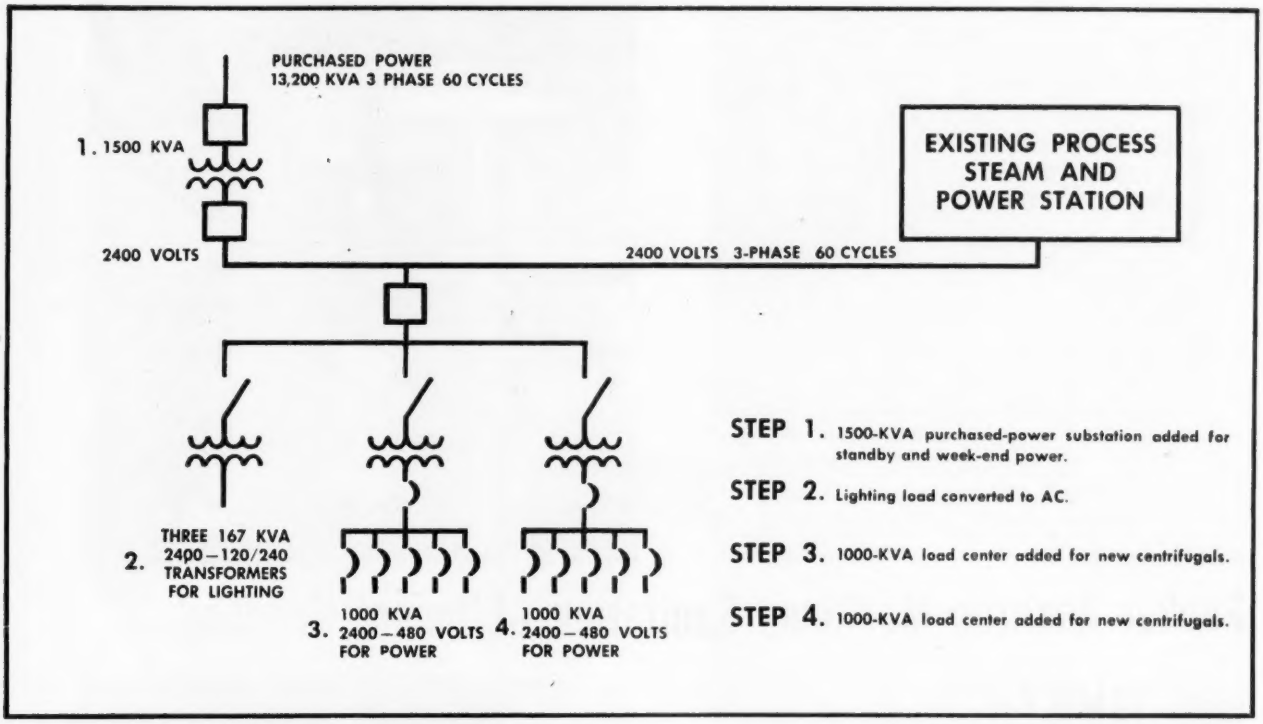


VOLTAGE IS STEPPED DOWN FOR CENTRIFUGALS by this G-E load-center substation. As future expansion takes place, others will be located in load areas throughout the plant.



MOTORS, CONTROL COST LESS—National Sugar's Pennsylvania Division modernized with automatic a-c driven centrifugals like these—cut installation costs, simplified controls.

For more information, use coupon on page 175.


PURCHASED POWER
13,200 KVA 3 PHASE 60 CYCLES
1. 1500 KVA
2400 VOLTS
EXISTING PROCESS STEAM AND POWER STATION
2400 VOLTS 3-PHASE 60 CYCLES
2. THREE 167 KVA 2400–120/240 TRANSFORMERS FOR LIGHTING
3. 1000 KVA 2400–480 VOLTS FOR POWER
4. 1000 KVA 2400–480 VOLTS FOR POWER
STEP 1. 1500-KVA purchased-power substation added for standby and week-end power.
STEP 2. Lighting load converted to AC.
STEP 3. 1000-KVA load center added for new centrifugals.
STEP 4. 1000-KVA load center added for new centrifugals.

SUGAR PRODUCTION WAS UNINTERRUPTED while the National Sugar Refining Company—producers of Jack Frost, Quaker, and Arbuckle's Sugar—carried out step-by-step power system expansion. Load-center substations, heart of new plan, make expansion easy—keep cost at minimum. Savings in cable, and a-c drives, have more than paid for system.

pays off at National Sugar Refining

Long-range system planning results in area-by-area modernization of both process and electrical systems at minimum investment

If your electrical distribution system can't take care of expanding production—and if complete modernization at one time would interfere with production and be uneconomical—then you'll be interested in the way the Pennsylvania Sugar Division of the National Sugar Refining Company solved this problem.

System *planning* was their key. G-E application engineers worked with Mr. Frank LeCompte, Construction & Development Engineer at National Sugar's Pennsylvania Division. Together, they designed a master a-c distribution system that was geared to the present system—and would accommodate future plant growth at minimum cost.

Then National Sugar put this master plan into action. The new a-c distribution system was purchased and installed section by section as processing facilities were modernized and expanded. This new system paid its way in savings in equipment, materials, and installation costs.

Reductions in original costs and capitalized operating expenses of ten new centrifugals, effected by using a-c instead of d-c drives, equalled the price of two new G-E load-center unit substations and several units of 2300-V switchgear. A 1500-KVA substation, operating from purchased power, quickly justified itself in meeting emergency standby requirements and in furnishing power on weekends.

General Electric application engineers can help you save the same way with a new power distribution system. Contact your nearby Apparatus Sales Office early in your planning. General Electric Co., Schenectady 5, N. Y. 652-13

Engineered Electrical Systems for Food Processing Plants

GENERAL ELECTRIC

For more information, use coupon on page 175.

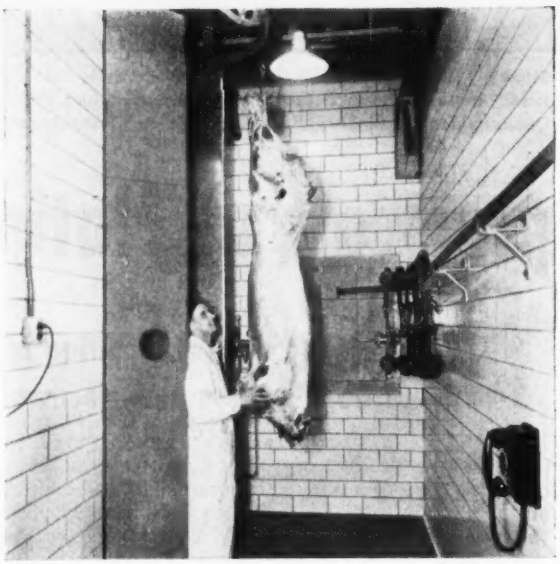
Owner: J. F. O'Neill Packing Co., Omaha
Contractor: A. Borchman Sons Co., Omaha
Architect: Willis Regier, A.I.A., Omaha

Packer Assures Maximum Sanitation—Efficient Handling with JAMISON Metal-Clad Doors

In this Omaha meat packing plant, Jamison Track Doors speed chilling room handling with minimum loss of refrigeration. Metal cladding of doors permits easy cleaning as often as desired. The result is a clean, sanitary plant throughout.

Freshly killed carcasses get a fast ride to the chilling room through the Series "50" Vestibule Track Door shown above. There's plenty of clearance . . . 11 feet of it. And the vestibule door closes immediately to save refrigeration. Other doors include a small, unique door especially installed for highest efficiency in returning trolley hooks.

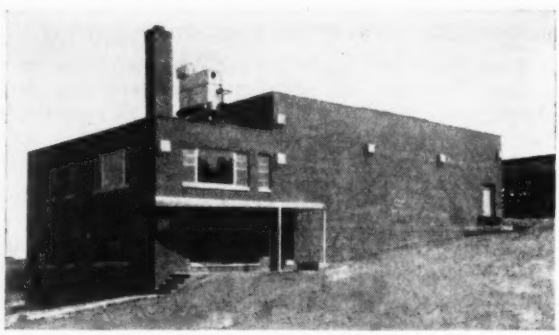
For information on how Jamison Doors can solve your problems, see your architect or write to Jamison Cold Storage Door Co., Hagerstown, Maryland.



Special Jamison Reach-In Door with track port provides an efficient chilling room exit for trolley hooks. This use of the door, gives clearance for the trolleys and holds losses to an absolute minimum.

JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.



Products can be packaged in liquid when these flexible, transparent cellophane bags are given an inner coating of BAKELITE Polyethylene.

wet pack wizardry

with BAKELITE TRADE-MARK Polyethylene

PACKING THESE PRODUCTS in their own juices is the only way to keep them fresh and flavorful. An inner coating of BAKELITE Polyethylene on cellophane bags fills the bill for economical, flexible wet-packaging of these goods.

This combination of materials provides a glossy package that is heat-sealable, wonderfully transparent and, above all, *leakproof*. It resists crumpling and stays flexible at temperatures as low as –70° F.

The tough inner coating of BAKELITE Polyethylene gives added strength, "juice-proofness" and resistance to tearing and abrasion. Chemically inert, it defies acids and alkalies common to foods.

As a laminate or coating for cellophane, foil or paper, BAKELITE Polyethylene film adds strength, toughness and heat-sealability. Used as a wax additive it reduces rub-off and increases surface gloss. Some of its scores of other packaging uses include snap closures, flexible tubes and the increasingly popular squeeze bottles. Get to know more about this versatile plastic and see what it can do for your packaging. For information, write to Dept. UE-74.

Packages by Howard Plastics, Council Bluffs, Iowa, made from "POLYCEL"—a product of **H. P. Smith Paper Co.**, Chicago, Illinois.

BAKELITE TRADE-MARK
Polyethylene

BAKELITE COMPANY
A Division of Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.

For more information, use coupon on page 175.

Announcing An Expanded Manufacturing

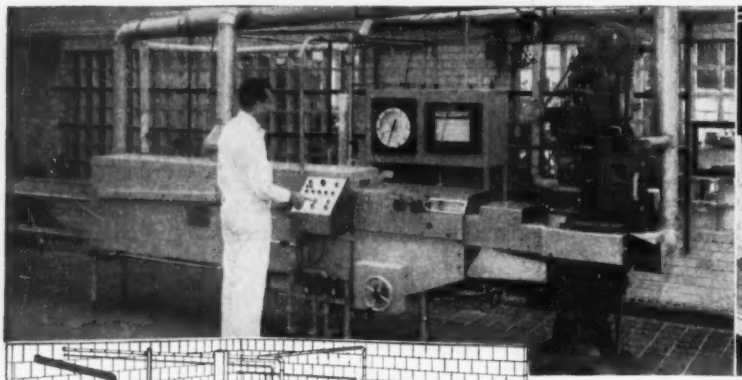
★ THE W. F. & John Barnes Company have designed and built specialized mechanical, electrical, and hydraulic equipment and machines since 1872. A highly successful Coordinated Designing, Engineering, and Equipment Manufacturing Service has been developed during these years that has helped many industries solve thousands of difficult production problems.

Now, Barnes announces an expanded program for the Food Processing Industry . . . a service that has been gradually developed during the past eight years. The five examples shown here are typical of the broad range of standard and special equipment that is today helping a number of processing plants to reduce work handling and cut costs.

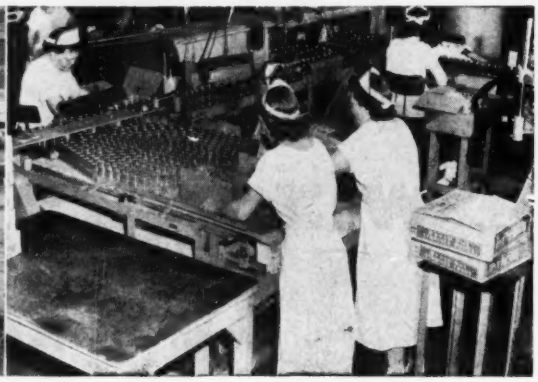
Since modernization and mechanization of manufacturing processes has been a Barnes specialty, you'll find competent engineering counsel and complete, dependable facilities available to help you solve complex problems quickly.

ASK FOR FREE ANALYSIS OF YOUR PROCESSING METHODS

Prepare now for even more competitive days ahead. Call in a Barnes Processing Equipment Engineer. He'll work with you in developing better cost-cutting methods and equipment.



MARTIN ASEPTIC CANNING SYSTEM—A short-time, high-temperature canning method that permits speedy, continuous processing . . . guarantees higher quality, better flavor, color, and texture of the product.



EMPTY GLASS SINGLE FILERS—Handle up to 600 jars per minute with practically no breakage. Design permits handling different sizes of jars. Semi-standard units available for odd-shaped jars or bottles; other units handle tin and glass interchangeably.

W. F. & JOHN BARNES

W. F. & JOHN BARNES COMPANY

PROCESS EQUIPMENT DIVISION

303 SOUTH WATER STREET • ROCKFORD, ILLINOIS

BUILDERS OF BETTER MACHINES AND

Engineering and Equipment

Service for Food Process Plants

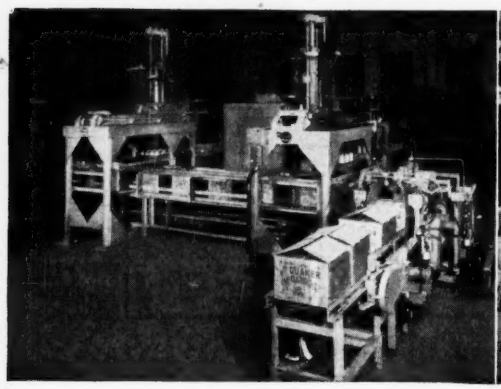
BARNES COORDINATED SPECIAL MACHINERY DESIGNING AND MANUFACTURING SERVICE INCLUDES:

1 PRELIMINARY ANALYSIS—Highly trained, skilled technicians work with you in analyzing your present facilities . . . recommend replacement or modernization where necessary.

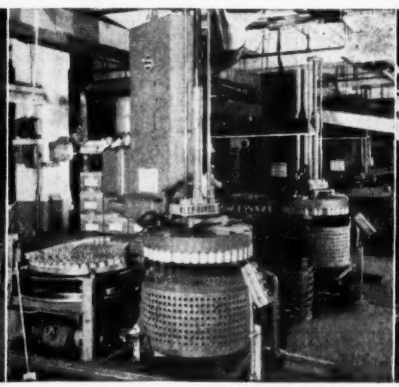
2 PROPOSALS AND COST ESTIMATES—Where new equipment is recommended, complete and detailed reports and a cost analysis are submitted for consideration.

3 DESIGNING AND ENGINEERING—Experienced Mechanical, Hydraulic, and Electrical Engineers work together at Barnes. Teamwork helps solve complex problems quickly and efficiently.

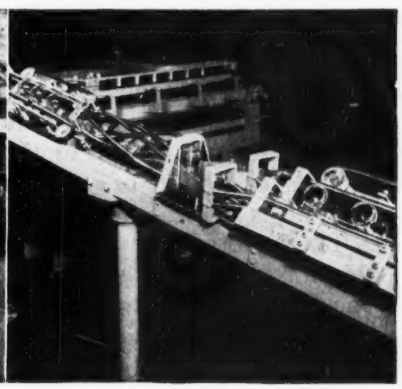
4 SPECIALIZED MANUFACTURING FACILITIES—A 75-year background and a large, well-equipped, efficiently tooled plant assure highest quality, dependable, cost-cutting machines and equipment.



CARTON UNCASERS AND RECASERS—High-speed, electro-magnetic equipment designed and built by Barnes to uncase, unscramble, count, pattern-form, and recase automatically. Unit above performs both operations. Individual units available to uncase or recase.



RETORT BASKET LOADERS AND UNLOADERS—Automatic hydraulic units for handling glass, round or square cans at speeds in excess of 600 per minute. Smooth, continuous automatic flow virtually eliminates glass breakage and dented cans.



SPECIAL CONVEYORS AND ELEVATORS—A wide variety of conveyors, teloscopic elevators, can elevators, inspection line conveyors, etc., designed and built by Barnes, speed processing and reduce work handling in food and beverage plants.

GET THESE *Facts*

There are reams of factual, down-to-earth information waiting for you . . . case histories — facts — figures for you to compare. Tear out and mail this convenient coupon NOW!

We are interested in additional information. Please send us free literature on the following, and additional data on your Engineering and Equipment Manufacturing Service:

- ☐ Martin Aseptic Canning System
- ☐ Empty Glass Single Filers
- ☐ Retort Basket Loaders and Unloaders
- ☐ Carton Uncasers and Recasers
- ☐ Special Conveyors and Elevators.
- ☐ We would like to have a Barnes Processing Engineer call at our plant.

NAME_____ POSITION_____

COMPANY_____

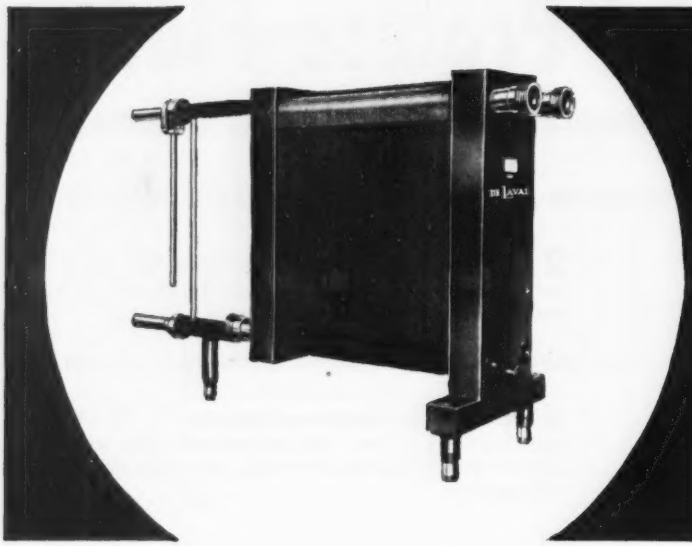
ADDRESS_____

CITY_____ ZONE_____ STATE_____

EQUIPMENT SINCE 1872

For more information, use coupon on page 175.

CLOSER CONTROL OF PRODUCT TEMPERATURES

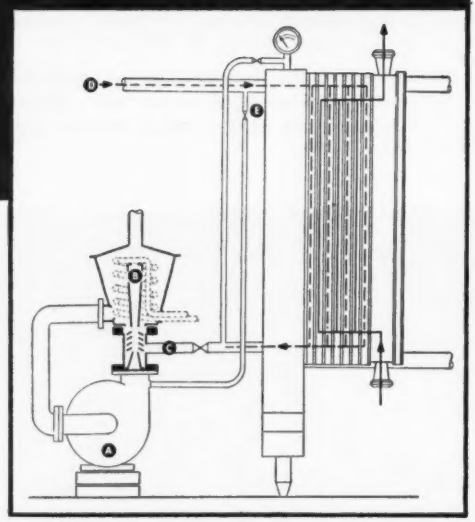


with the De Laval Plate Heat Exchanger and Vacuum-Steam Heating System

One of the important features of the De Laval Plate Heat Exchanger, when using the De Laval Vacuum-Steam Heating System, is close control of the heating medium temperature. This results in full protection of your product quality and minimizes the possibility of "burn-on."

The system is simple and efficient. For example, steam temperature at zero pressure is 212° F. If a vacuum of 18 inches is created in the heating section, by the vacuum-steam pump, the temperature is reduced to 170° F. Thus, by reducing pressure in the unit by means of the De Laval Vacuum-Steam Heating System, the steam expands and at the same time drops in temperature. With a constant-set vacuum, the correct heating temperature is maintained by the amount of steam automatically introduced into the Plate Heat Exchanger.

Thus, time lag is practically eliminated and a constant hold of product temperature is obtained. The "split" between heating medium temperature and product temperature is *really* close—and closely maintained! Why not ask us for more information?



Shown above is a diagram of the De Laval Vacuum-Steam Heating System. Connecting with the steam side of the plates in the heating section is a vacuum apparatus consisting of centrifugal pump (A) which circulates water through water jet (B) in circulating tank. Jet is connected to condensate outlet (C) so that jet suction creates vacuum in heating section. This causes steam entering the unit (D) to expand to degree of vacuum thus created, and the temperature of the steam to be lowered to the desired point. Expanding steam is prevented from becoming super-heated by saturating device (E).

DE LAVAL

THE DE LAVAL SEPARATOR COMPANY
GENERAL OFFICES • POUGHKEEPSIE, N. Y.
427 Randolph St., Chicago 6
DE LAVAL PACIFIC COMPANY • 61 Beale St., San Francisco 5

For more information, use coupon on page 175.

"They taste first with their eyes"

National

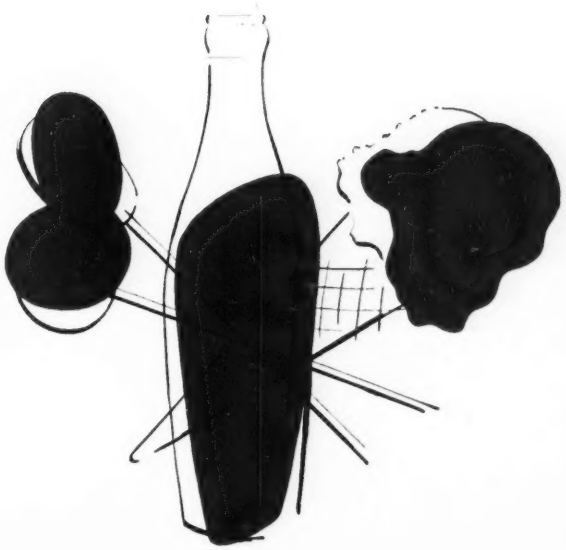
CERTIFIED

FOOD COLORS

Sight and taste are complementary senses, as every psychologist knows. In other words, "What looks good, tastes good."

Our business is helping manufacturers to add the tinge of color that emphasizes the goodness of wholesome foods and beverages. Our Certified Colors are produced from basic raw materials wholly within our Buffalo plant by men who understand and respect your insistence upon purity. For over 50 years National Food Colors have set the industry's standard for uniformity of shade, pure-dye strength and composition.

Since the finest food colors cost so little, why not standardize on National Food Colors?



CERTIFIED COLOR DIVISION

NATIONAL ANILINE DIVISION ALLIED CHEMICAL & DYE CORPORATION • 40 RECTOR ST., NEW YORK 6, N. Y.

Boston Charlotte Chicago Philadelphia Portland, Ore. San Francisco Toronto

Allied Chemical

GAIR can help PROMOTE YOUR PRODUCT

with eye-appeal PRINTING

Attractively printed Gair shipping boxes double as sales promotion aids — giving prominent display to brand names while traveling through the channels of distribution. Prospects along the way — from factory to warehouse, to store, to home — see these sales messages.

Look around. You'll notice that products from paints to peanuts, from soaps to stoves carry colorful, well-printed identification on their shipping boxes. What about yours?

Remember, this traveling display is economical. You own the "billboards" . . . for just the cost of plates and printing you add a strong link to your promotional chain.

To learn how your shipping box can double as a sales promotion aid, check with the Gair plant nearest you. Learn, too, how Gair's assured supply source, engineering ability and delivery service help give you the best in corrugated or solid fibre shipping boxes.

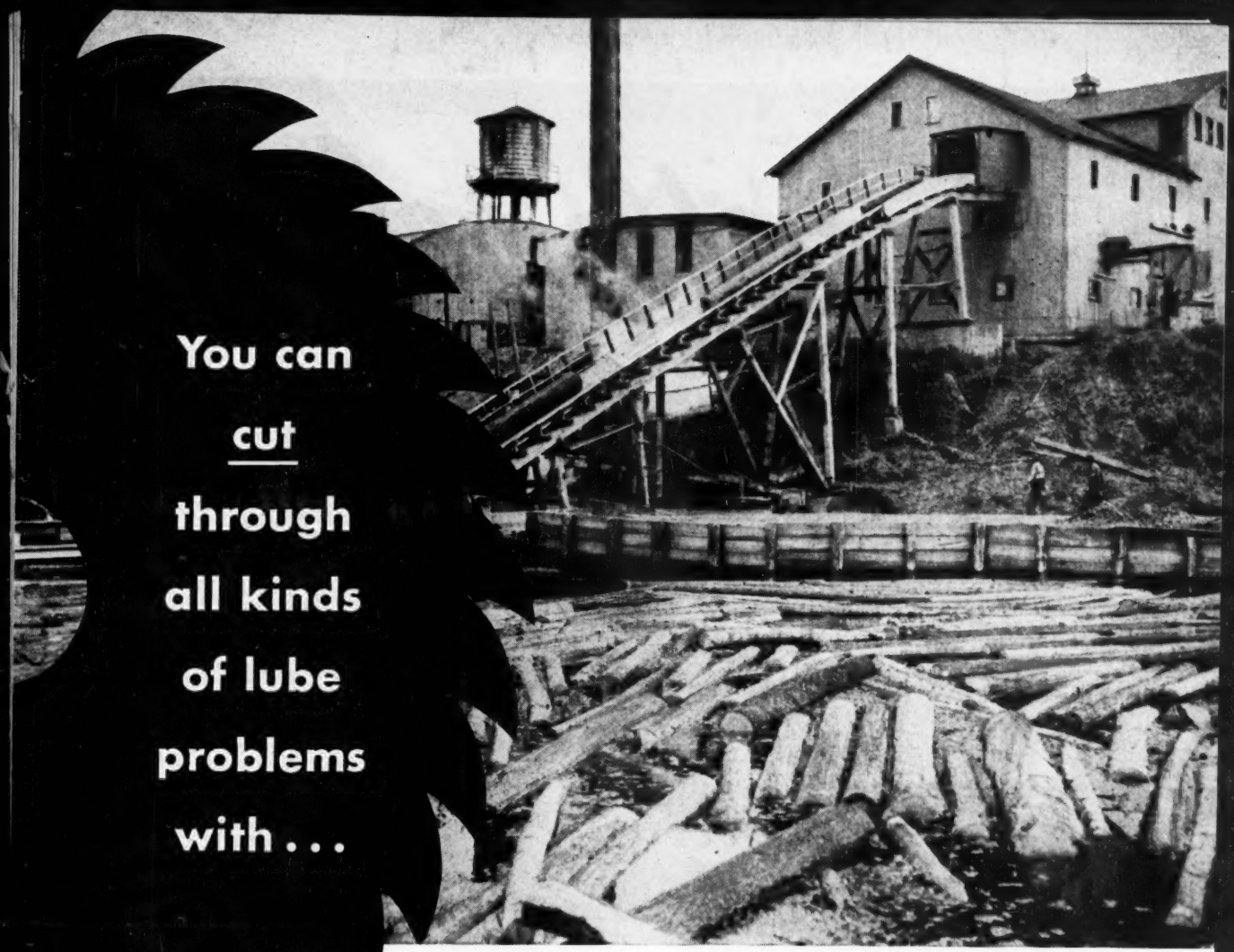
Ask for a copy of the Shipping Case Handbook.

CAMBRIDGE, MASS. • CLEVELAND, OHIO • HOLYOKE, MASS. • MARTINSVILLE, VA. • NO. TONAWANDA, N. Y.
PHILADELPHIA, PA. • PORTLAND, CONN. • RICHMOND, VA. • SYRACUSE, N. Y. • TETERBORO, N. J.

GAIR

SHIPPING CONTAINERS
FOLDING CARTONS
PAPERBOARD

ROBERT GAIR COMPANY, INC. • 155 EAST 44th STREET • NEW YORK 17



You can cut through all kinds of lube problems with . . .

STANODRIP Dripless Oils

STANODRIP Dripless Oils are particularly suited for use in processing industries (food, rubber, etc.) where possible contamination from oil poses a lubricating problem. If your plant is in the Midwest, there's a trained Standard Oil lubrication specialist nearby who can be of service to you.

● This story about a sawmill describes a problem that is common to many industrial plants. And it tells about a service that solves a thousand and one different problems in the operation of industrial machines.

The sawmill pictured above was having trouble with overheated bearings, as well as with high consumption of oil on these particular bearings. In addition, there was excessive dripping of the oil on the floor, creating a safety hazard.

The mill operators asked for the services of the near-at-hand Standard Oil lubrication specialist, C. F. Klenner. He recommended a trial of STANODRIP Oil No. 99, an oil having remarkable dripless qualities and at the same time capable of withstanding high heat.

After a reasonable trial period, inspection revealed that consumption was greatly reduced, bearing temperatures were considerably lower and there were no more oil puddles on the floor. STANODRIP Oil No. 99 was then placed in all line shaft bearings and since then, there have been no bearing failures.

STANODRIP Dripless Oils are part of a complete line of Standard lubricants developed to serve the many machinery lubricating problems of industry. If you want help or information, phone your nearest Standard Oil office or write: Standard Oil (Indiana), 910 S. Michigan Avenue, Chicago 80, Ill.

STANDARD OIL COMPANY STANDARD *(Indiana)*

...invisible values

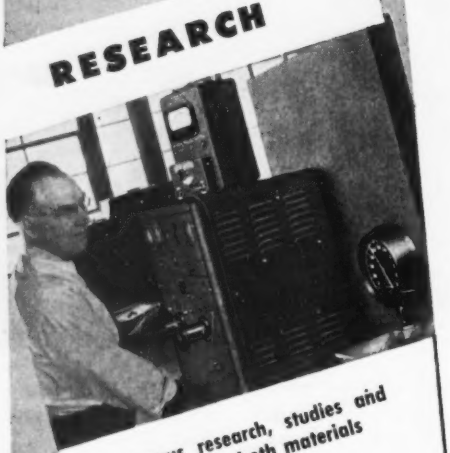
Separate an Ashcroft Gauge into its component parts and many of the reasons that have made it the leader for over a century remain unseen. For they are invisible values . . . equally as important to the sustained high accuracy and long-life endurance of the gauge as the Bourdon Tube, the movement, linkage, case and other components.

Creative research, highly functional design, quality control of both materials and methods and rigid manufacturing standards are "built into" every Ashcroft Gauge . . . are the fundamental reasons why high performance standards are expected and attained in every gauge bearing the Ashcroft Shield.

The new Ashcroft Gauge Catalog 300 is now available. Write for a copy.

YOUR INDUSTRIAL SUPPLY DISTRIBUTOR is thoroughly acquainted with the various lines of Ashcroft Gauges. You can depend on him to help you in selecting the right type for your particular needs—and to deliver promptly.

RESEARCH



Continuous research, studies and tests guarantee both materials and methods.

Completed designs as well as individual components are subjected to "breakdown" tests in the Research Laboratory pictured here. These tests subject all materials and methods to vigorous analyses . . . are designed to keep Ashcroft ahead of future as well as current gauge requirements regardless of industry demands.

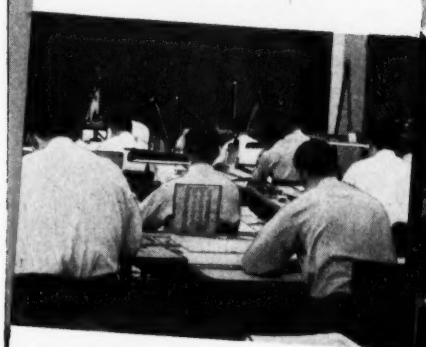
ASHCROFT GAUGES

For more information, use coupon on page 175.

# of ASHCROFT GAUGES

1850 ASHCROFT U.S.A.

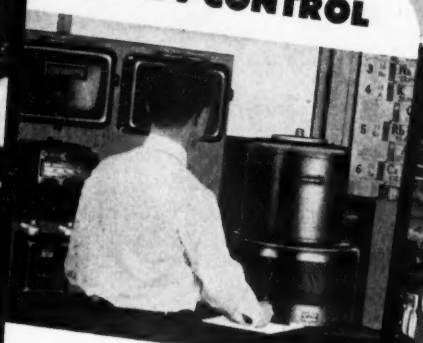
DESIGN



Sustained accuracy is the major objective of the design function.

Where research largely determines materials and methods to be used, the design function is primarily concerned with sustained high accuracy. The drafting room shown above is one of the most essential "creative centers" in the progress of an Ashcroft Gauge from original research to finished product.

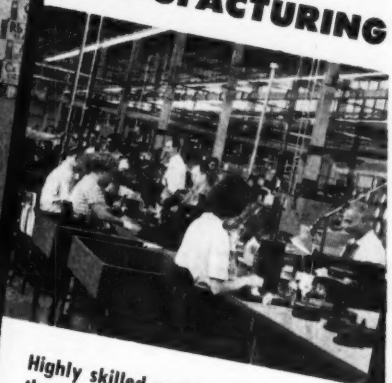
QUALITY CONTROL



Ashcroft metallurgists subject all raw materials and parts to thorough examination and tests.

Augmenting research and design, quality control exhaustively examines, for functional surety, all materials used in the gauge as well as the finished product. No substitute for final inspection, quality control "guards the gauge" from original design to final manufacture.

MANUFACTURING



Highly skilled craftsmen command the most modern equipment and plant facilities to assure manufacturing excellence.

This unbeatable combination produces the Ashcroft Gauge . . . an achievement in metal . . . first conceived by Ashcroft research and design engineers and completed by unmatched production techniques. Pictured is one of the assembly sections where perfection of gauge performance is considered a manufacturing challenge as well as a responsibility.

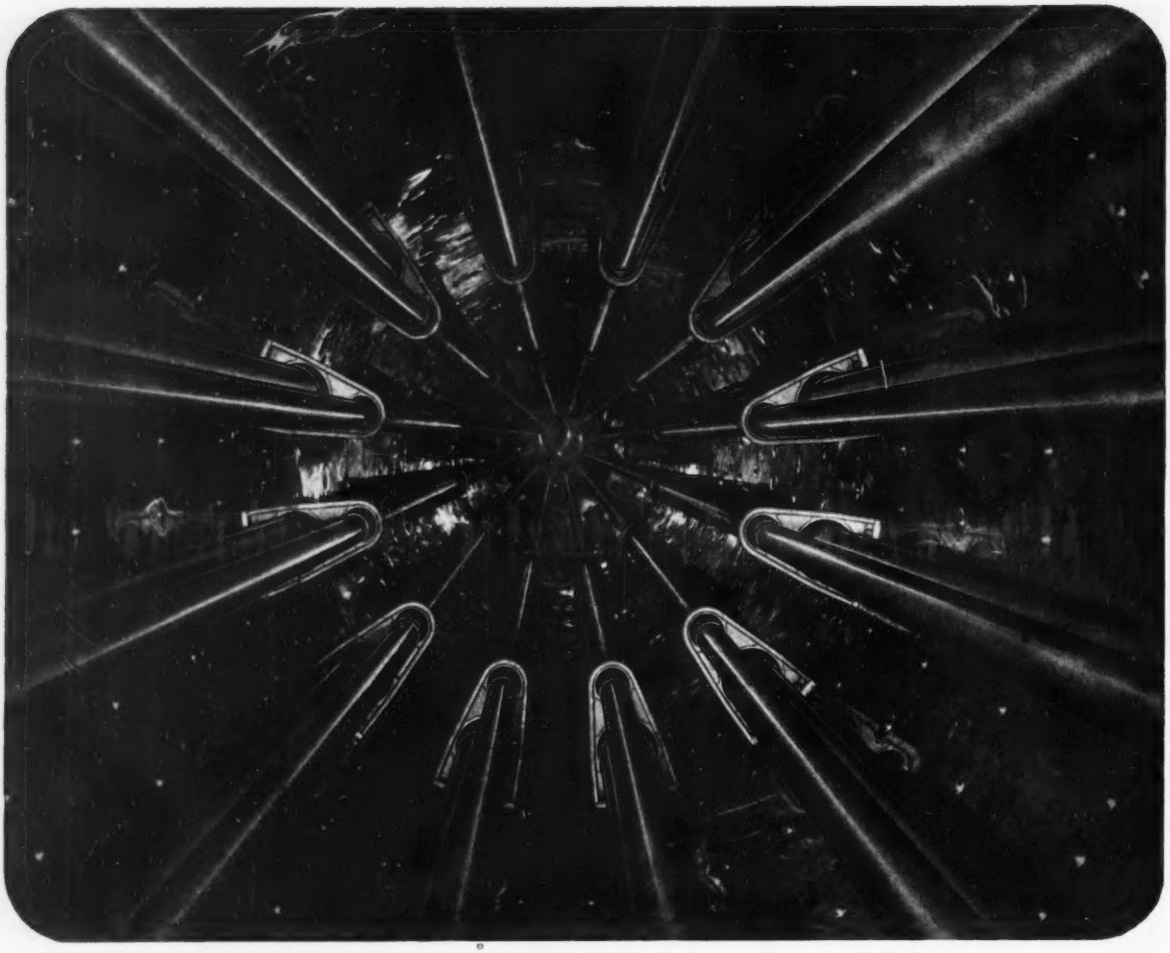
1850 ASHCROFT U.S.A.

A PRODUCT OF MANNING, MAXWELL & MOORE, INC.

STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'HANCOCK' VALVES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

For more information, use coupon on page 175.



TRENTWELD STAINLESS TUBING gives longer operating life...

FREE—Write for your copy of the new TRENTWELD price calculator. Just a tug at the selector slide gives you complete price information and weight per foot of the tubing size and grade you need. Better send for your free copy now.

TRENTWELD stainless steel tubing gives economical, trouble-free service over long periods of use. It's an ideal choice, for example, for applications such as the 60-foot rotary kiln dryer you are looking into in the photograph above . . . operating at high temperatures and where corrosive conditions are encountered.

In fact, you just can't buy better tubing than TRENTWELD for any application. That's because TRENTWELD stainless and high-alloy *welded* tubing is a product of tube mill specialists. Each tube has a uniformly sound weld indistinguishable from the parent metal and just as strong and corrosion-resistant.

Whether or not your job is as large and complex as a rotary dryer, you can specify TRENTWELD tubing with confidence. And when it comes to tubing sizes and finishes, Trent offers the widest range in the industry . . . from ⅛" to 40" O.D. and up. Next time you have a job involving tubing, remember—you can make it better with TRENTWELD.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

Make Your Package Your Crack Salesman!

EKCO - FOIL CONTAINERS

The Greatest Packaging Development of the Century!

Ekco-Foil, the wonderful new pre-shaped aluminum foil package, offers advantages no other packaging material can duplicate! You can prepare your product in Ekco-Foil . . . freeze or refrigerate it in Ekco-Foil . . . then sell it in the same attractive Ekco-Foil package. Labor costs go way down . . . and sales go way up! Your bright silver Ekco-Foil package promises quality and convenience to Mrs. Consumer. She just reheats and serves your product right in its Ekco-Foil package. And she can reuse the package too!

Ekco-Foil makes it practical for you to take advantage of this new packaging material right now, because Ekco-Foil is available for immediate delivery in every size and shape you need! Only Ekco has a complete selection! Only Ekco can make your foil containers in any quantity!

Ekco-Foil has never failed to raise sales for any product. Why not see what it can do for you!

EKCO PRODUCTS COMPANY
1949 N. Cicero Avenue, Chicago 39, Illinois
Also Available From Ekco Products Company (Canada) Ltd., Toronto

VALUABLE COUPON

EKCO Products Company, Ekco-Foil Container Division FE-4
1949 N. Cicero Avenue, Chicago 39, Illinois

( ) Please send Bulletin and samples.
( ) Please have representative call.

FIRM _____

NAME AND TITLE _____

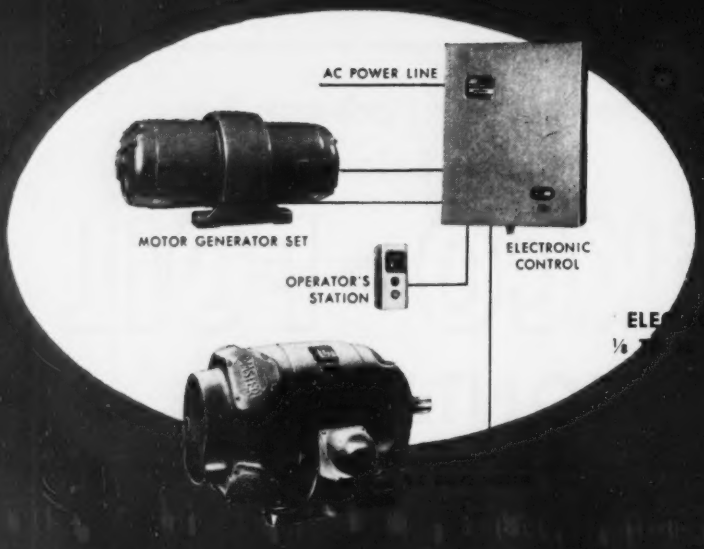
ADDRESS _____

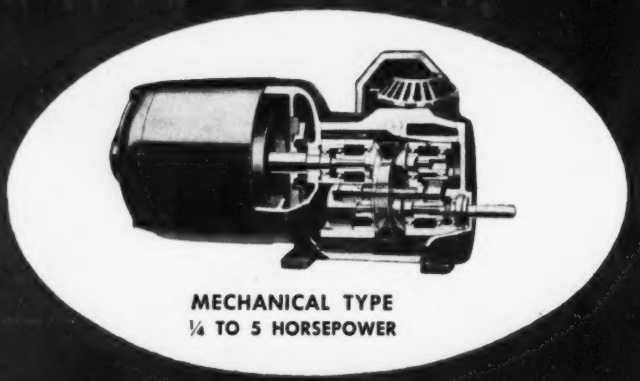
CITY _____ ZONE _____ STATE _____

We are interested in Ekco-Foil for packaging _____
please list products

©1954

For more information, use coupon on page 175.



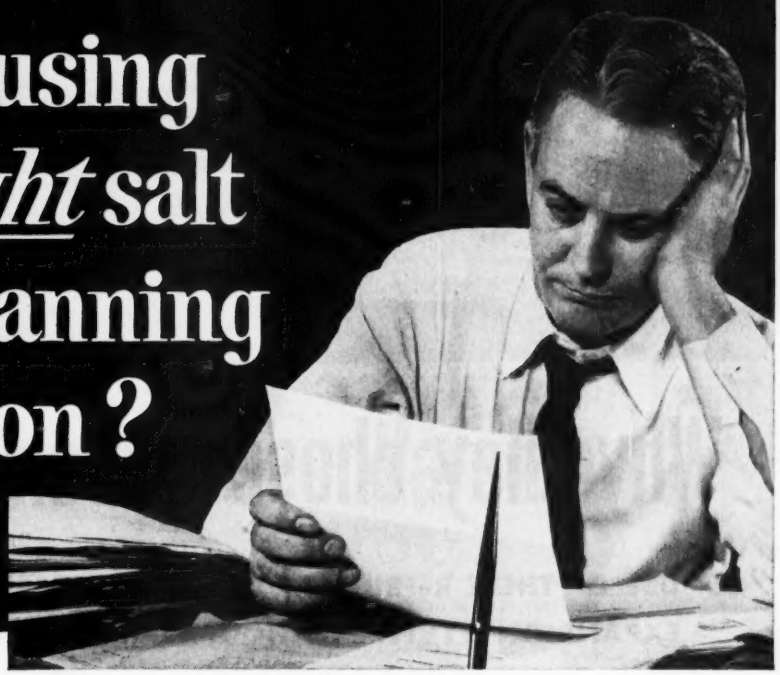


MECHANICAL TYPE
¼ TO 5 HORSEPOWER

SPEEDRANGER

Need variable speed . . . come to MASTER, the only manufacturers of variable speed drives who can offer you a choice between the advantages of MECHANICAL variable speed and ELECTRONIC variable speed operation. And since both the mechanical and the electronic drives are available with any of MASTER'S five types of gear units, you can secure speed variation in either high speed or low speed ranges. Always check with MASTER for impartial help in selecting the drive that is right for you. **THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO**

Are you using the *right* salt in your canning operation?



The *right* salt—and the *right* salting method—can save you money *and* improve your product.

And that's where Morton's *3-Way Salting Service* can help you plenty!

First,
Morton offers expert advice on the *right* salt and *right* salting method for your operation through its trained staff of Consulting Engineers. On request, a representative will call and analyze your particular requirements . . . with the objective of saving money and improving quality.

Second,
only Morton offers a *complete* line of canning salts —including the *right* salt for your needs, always available at favorable prices and freight rates. This is possible because only Morton has *nine* plants, strategically located to serve you promptly and economically wherever your cannery may be.

Third,
Morton offers three labor-saving salting methods that can cut your costs. The *Salt Tablet Depositor* drops *one* tablet in *each* can at high speed with never-fail accuracy. The *Bulk Salter* meters precise amounts into each can by the economical bulk method. The *Morton Brinemaker* delivers up to 800 gals. of clear, fully saturated brine an hour, piped anywhere in your plant.

Stop and Think!
A thorough, no-obligation study of your salting operation may boost your profits. Better mail the coupon below today!

MORTON SALT COMPANY
Industrial Division
Dept. EM-4, 120 S. LaSalle St.
Chicago 3, Illinois

CLIP AND MAIL COUPON TODAY!

Please send me full details on the Morton Brinemaker. I would also like information on:

☐ Morton Canning Salt ☐ The Bulk Salter ☐ The Salt Tablet Depositor

Name and Title_____

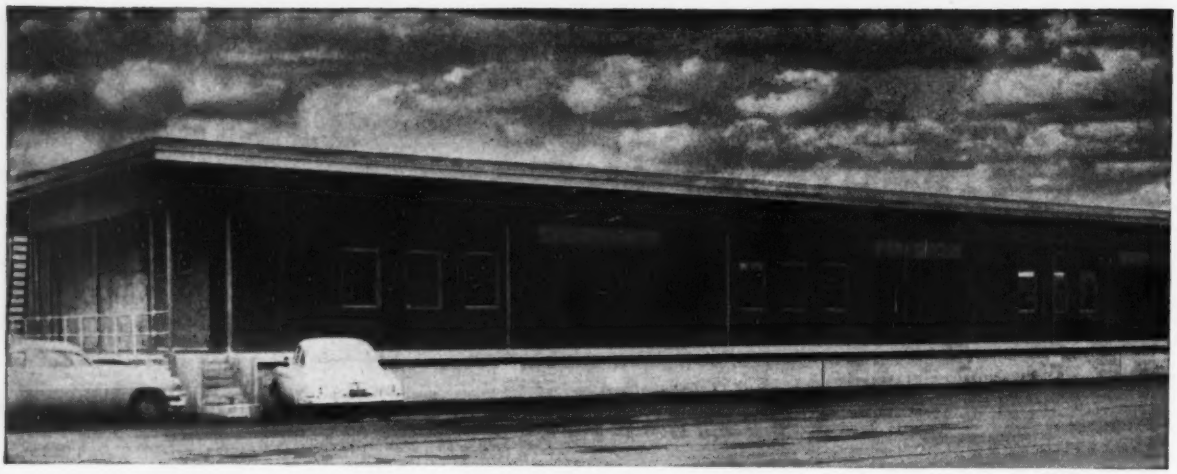
Firm_____

Address_____

City_____ Zone____ State_____

(Brinemaker not available on West Coast)

For more information, use coupon on page 175.



Why they chose "Freon" refrigerants

USE OF THESE REFRIGERANTS MAKES POSSIBLE EFFICIENT, DIRECT EXPANSION SYSTEM WITHOUT FEAR OF FOOD CONTAMINATION

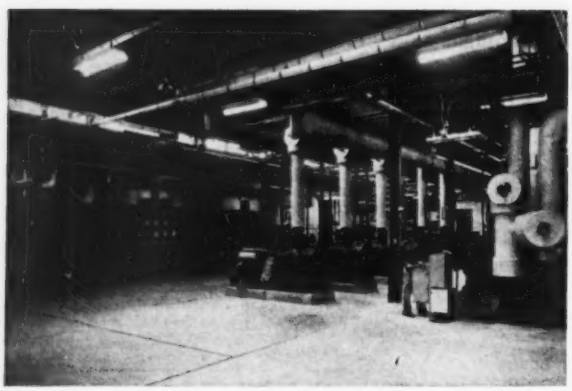
In planning a new, ultra-modern refrigerated warehouse at Landover, Maryland to serve the greater Washington (D.C.) trading area, far-seeing owners of the Merchants Terminal Corporation instructed engineers to part with tradition . . . if necessary. They wanted a plant of the most efficient design . . . a plant that would permit use of mechanized handling, palletized storage and the straight flow of goods on one floor level. They also wanted a modern refrigeration system that would be safe as well as efficient.

DESIGN CONSIDERATIONS

In the past, big cold storage warehouses were frequently multi-story structures with many small storage rooms. Modern lift trucks prove impractical in most multi-story warehouses and goods therefore have to be moved about by hand.

SINGLE STORY TYPE CHOSEN

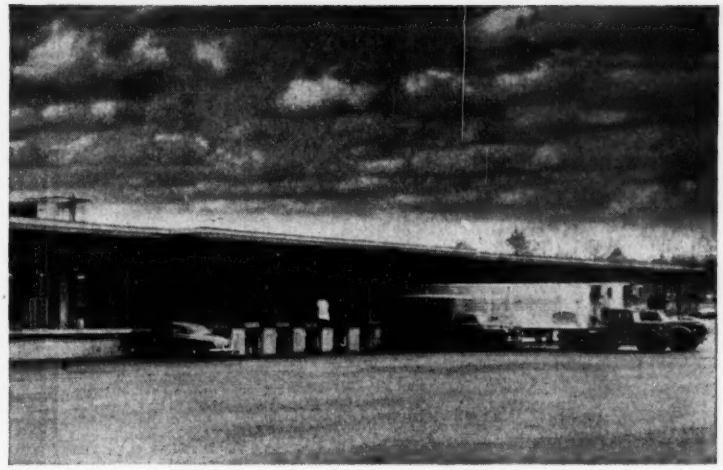
By designing the warehouse with large storage rooms on a single floor it permitted both the use of lift trucks and the palletized system of storage. The large storage rooms allow more efficient, speedier handling of merchandise from a greater number of trucks and railroad cars. Straight flow of goods from one end of the warehouse to the other is also possible.

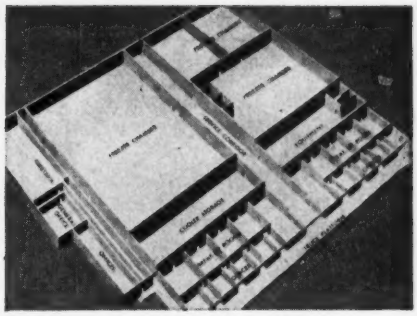


Equipment room houses three 12-cyl. *York* high stage compressors, operated with "Freon-12" refrigerant, two 8-cyl. compressors and four FES-Fuller rotary (low stage) compressors. Since the system was placed in operation there has been no damage to food products from leaks.

Single story floor plan permits utilization of time and space saving equipment. Here an efficient lift truck loads merchandise into one of the quick freeze tunnels where temperature of -40°F. is maintained. "Freon" refrigerants provide a wide range of temperatures.

For more information, use coupon on page 175.





Exterior of Merchants Terminal Warehouse showing long loading and unloading dock. Structure contains well over 2 million cu. ft. of freezer and storage space. Floor plan (above) shows arrangement of freezer chambers, cooler storage, equipment room and other work areas.

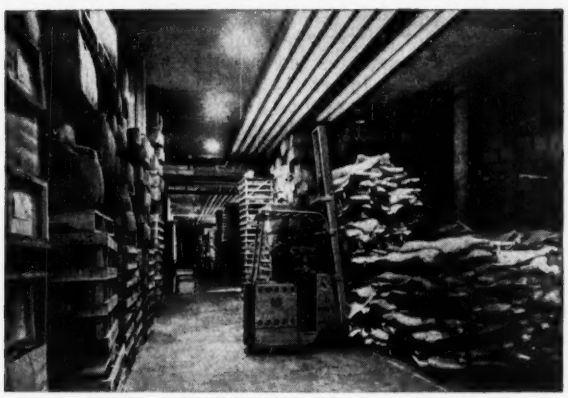
for the modern *Merchants Terminal* Warehouse

"FREON" REFRIGERANTS SELECTED

When it came to selecting the refrigeration system, V. C. Patterson & Associates, Inc., the refrigeration consultants on the project, recommended a direct expansion system using Du Pont "Freon-12" dichlorodifluoromethane refrigerant. Because "Freon" refrigerants are harmless to food products, they were able to make this recommendation with no fear of product or personal hazard danger. Less installed refrigeration capacity is also required than would be needed for an indirect brine system. This means savings in power, space, machinery and auxiliary equipment such as pumps and other items.

SYSTEM IS SAFER . . . FASTER . . . COSTS LESS

The direct expansion system using "Freon-12" permits cooling of rooms safer and faster. Lower head pressures mean added safety and prolong machinery life with lower maintenance costs. When compressed, the "Freon-12" refrigerant reaches only about 150°F. compared to nearly 300°F. for other refrigerants sometimes used. These lower temperatures also mean longer parts life.



One of four large freezing rooms held at -5°F. Note overhead cooling coils. "Freon" refrigerants permit safe, efficient direct expansion. This, and the Merchants Terminal Baltimore Warehouse, are two of the largest warehouses using "Freon" refrigerants ever built.

"FREON" REFRIGERANTS MEET EVERY NEED OF THE FOOD INDUSTRY

Although your own refrigerating needs may not be as extensive as were those of the Merchants Terminal Corporation, you'll still want a refrigeration system that's adequate . . . safe . . . economical . . . dependable and as compact as possible. That is why it is always best to select equipment operated with "Freon" refrigerants.

These refrigerants are ideal for every refrigerating need within the food industry . . . in processing, transporting, storing and selling. They are safe . . . nonflammable, nonexplosive, noncorrosive and virtually nontoxic. They're made by laboratory-controlled methods that insure quality and uniformity . . . factors contributing to the economical, satisfactory performance of the machines over long periods of time. Why not discuss the subject with your own engineers—now? It's possible they may suggest many new ways in which refrigeration can better serve your interests. *Write for interesting 40-page brochure on "Freon" Safe Refrigerants.* It's free. E. I. du Pont de Nemours & Co. (Inc.), "Kinetic" Chemicals Division, Wilmington 98, Delaware.

KINETIC
REG. U.S. PAT. OFF.

FREON

SAFE REFRIGERANTS

"Freon" is Du Pont's registered trade-mark for its fluorinated hydrocarbon refrigerants

DU PONT
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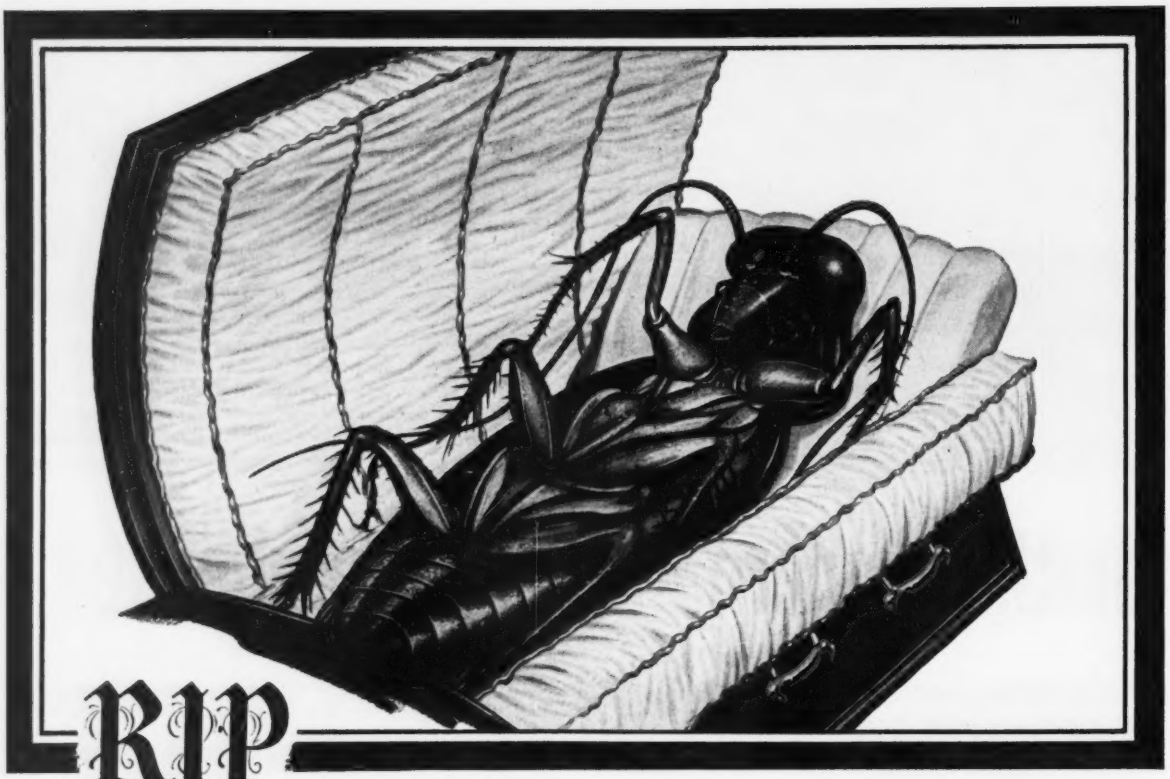
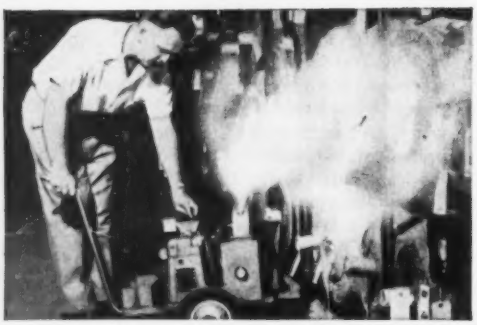
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

For more information, use coupon on page 175.



control insects with VAPOSECTOR!



West Atomizing Equipment (portable or permanent) has exclusive suction spray nozzles that produce a "dry fog" with uniformly sized 8-micron VAPOSECTOR droplets. These nozzles use less insecticide, cover a wider area, produce a greater kill.

High-potency VAPOSECTOR is formulated for the realist who has an insect problem and wants to get rid of it – *fast!*

VAPOSECTOR is many times more concentrated than the standard grade AA spray – and over four times as economical in use. There's no danger of contamination or odor when used according to directions. It is noncorrosive and will not injure metals, finished surfaces or fabrics, when used as directed.

VAPOSECTOR controls insects by "double penetration." When used with West atomizing equipment, it becomes a "dry fog" that reaches and penetrates hiding places, and then penetrates the insect's outer covering for a permanent kill. Insects have no place to hide, no time to escape. Demonstrations have revealed dead insects in numbers never thought possible.

West can supply VAPOSECTOR, special mill sprays and fumigants, residual and contact insecticides, spraying equipment – *or a complete insect control program tailored to fit your needs!*

WEST DISINFECTING Company

42-16 West Street, Long Island City 1, N. Y.
In Canada: 5621-23 Casgrain Ave., Montreal
Branches in principal cities

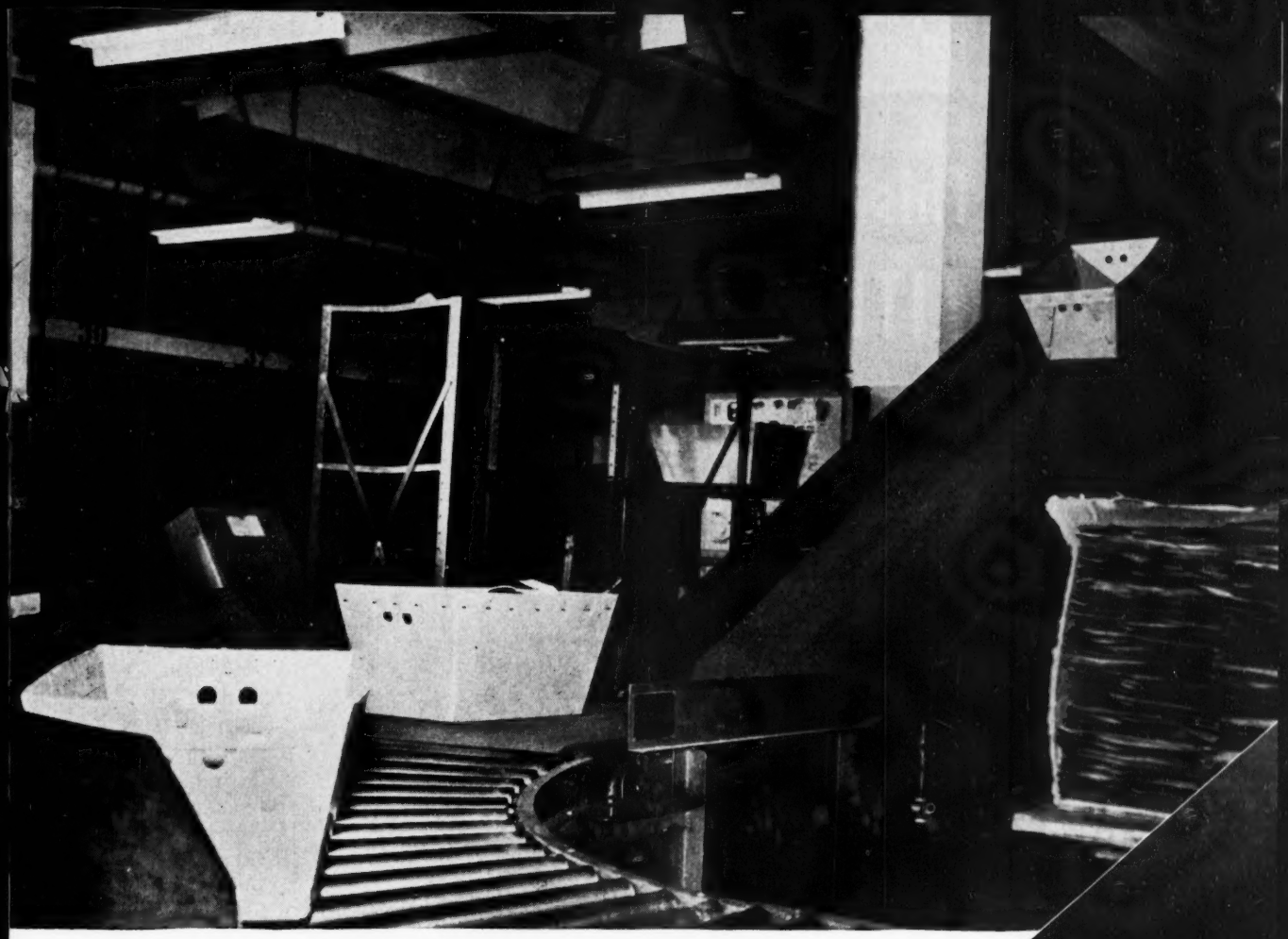
WANT DETAILS?

Tear out this coupon and mail it with your letterhead.

☐ I'd like a FREE copy of West's 36-page booklet on INSECT CONTROL.

☐ I'd like to talk to a West representative about INSECT CONTROL – without obligation.

Dept. 8



Thermoid Conveyor Belting cuts your handling costs

There's a Thermoid Conveyor Belt designed to lower your costs on every type of materials handling job. Each is best suited for the particular type of service recommended. Here are 3 selected from the complete Thermoid line: **NEOPRENE**—built especially for conditions where heat and oil are encountered; **THERMOGLAS**—designed for use where belt is exposed to temperatures of 275° to 350° F.; **RUFFTOP**—Thousands of irregular gripper points guide smooth surfaced articles up inclines to 35°.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life, less down time, lower handling costs. Your Thermoid Distributor can help you select the Conveyor Belt best suited to your requirements. If you prefer, write direct for Catalog 3679.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

This DICALITE "Micro-sieve" removes up to

Openings so small that thermophiles

and undesirable colloids can't get through—

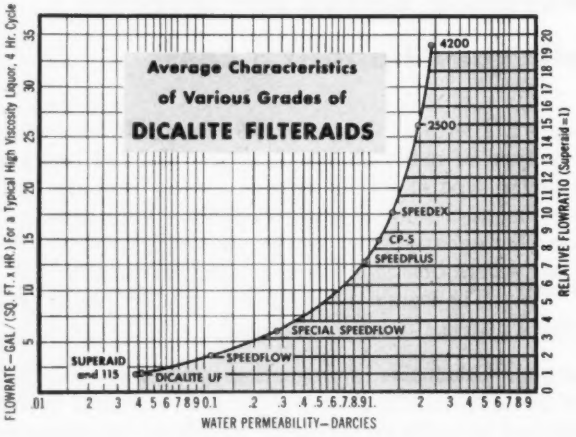
so many that you get high flow-rates through the filter.

95% of Thermophiles

FOR EXAMPLE, IN SUGAR REFINING

Many tests, made in regular plant operation, have shown that Dicalite Filteraids give such "sharp" filtration that thermophilic bacteria and other extremely fine solids are practically eliminated. And that, as most sugar engineers agree, is the best way to make sugars that will come up to highest standards.

Thus Dicalite Filteraids help produce sugars with minimum thermophilic bacteria count for canners, bottlers, and other food processors. Likewise the performance of Dicalite is just as effective in filtering any liquid in food processing where removal of bacteria is involved. Larger solids are, of course, removed as thoroughly. Fast flowrates insure meeting production schedules and keeping costs down, with flexibility in choice of Dicalite grades at times of peak demands. A Dicalite engineer will gladly call on request to discuss any problem or project you may have involving filtration.

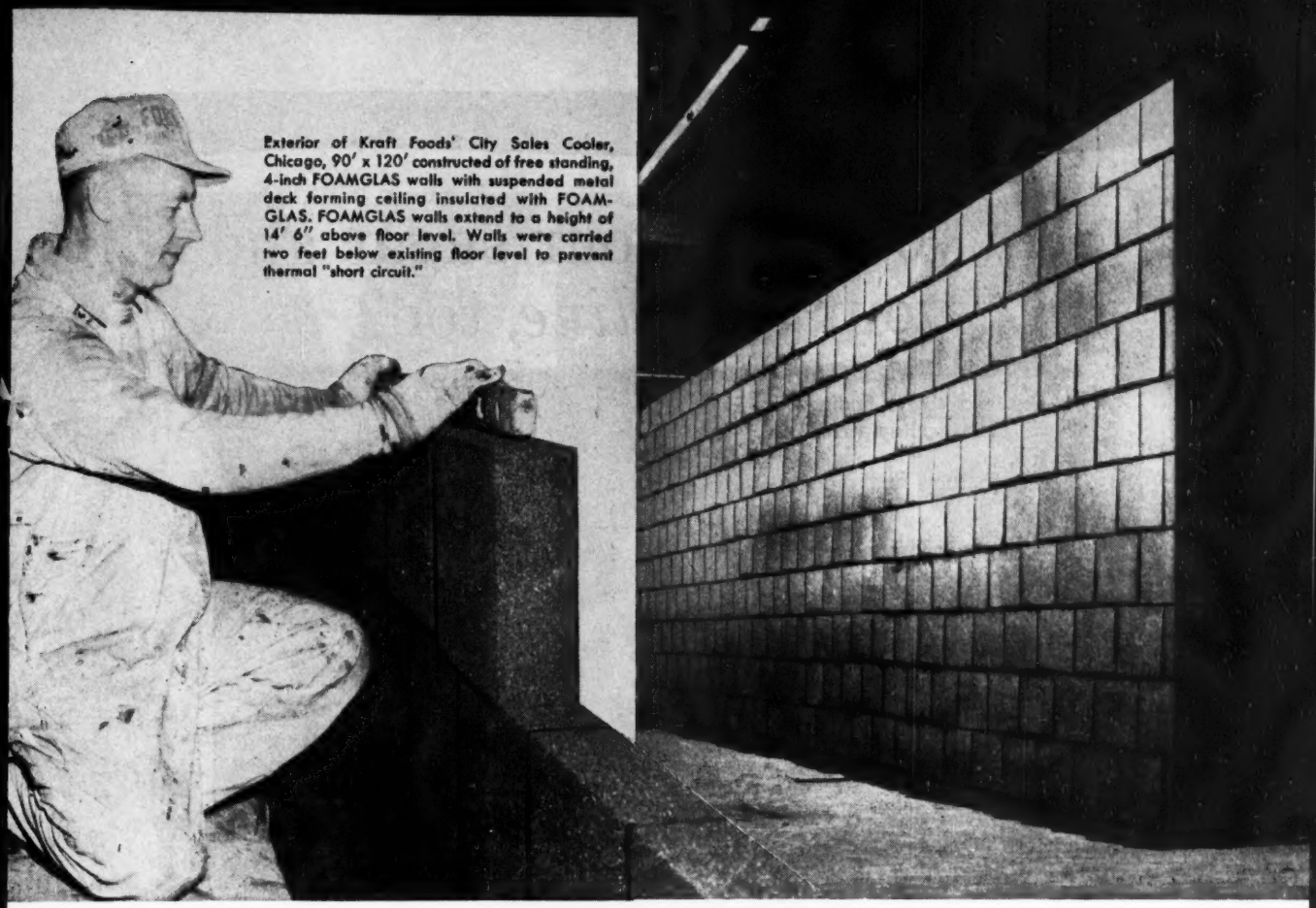


WRITE FOR YOUR COPY OF BULLETIN B-12

Dependable GREAT LAKES Dicalite® DIATOMACEOUS MATERIALS

DICALITE DIVISION • GREAT LAKES CARBON CORPORATION • 614 S. FLOWER ST., LOS ANGELES 17, CALIFORNIA

For more information, use coupon on page 175.



Exterior of Kraft Foods' City Sales Cooler, Chicago, 90′ x 120′ constructed of free standing, 4-inch FOAMGLAS walls with suspended metal deck forming ceiling insulated with FOAMGLAS. FOAMGLAS walls extend to a height of 14′ 6″ above floor level. Walls were carried two feet below existing floor level to prevent thermal "short circuit."

Free-standing FOAMGLAS insulating walls, erected without supports, cut costs for KRAFT

Kraft Foods Company cut construction costs by using the high compressive strength and rigidity of FOAMGLAS to construct two coolers *within* the existing structure of their Food Storage Building in Chicago. Substantial savings were realized by Kraft when they were able to use the unique strength and rigidity of FOAMGLAS to erect self-supporting free standing FOAMGLAS walls without temporary studs . . . to construct the coolers *and* insulate them in one step with one quality material.

With free standing FOAMGLAS construction, Kraft got not only strong, durable walls and inner partitions, but outstanding insulation performance as well. Since FOAMGLAS *can not* absorb damaging moisture, it maintains *constant* high insulating efficiency without costly maintenance. Moreover, FOAMGLAS is fire-proof, rot-proof and vermin-proof.

Let FOAMGLAS work for *you* . . . by giving you constant, lasting insulating efficiency plus unique design advantages. Send now for a sample of this remarkable insulation and our new booklets covering use of FOAMGLAS to insulate walls, ceilings, roofs, floors, piping and equipment in refrigerated structures or normal temperature buildings. Use the handy coupon conveniently located below.

PITTSBURGH CORNING CORPORATION

One Gateway Center • Pittsburgh 22, Pa.

FOAMGLAS®

the cellular, stay-dry insulation

PITTSBURGH PC CORNING

Pittsburgh Corning also makes PC Glass Blocks

Pittsburgh Corning Corporation, Dept. O-44A
One Gateway Center, Pittsburgh 22, Pa.

Please send me a free sample and the following brand new FOAMGLAS literature:

- ☐ New booklet on FOAMGLAS building insulation.
- ☐ New booklet on FOAMGLAS low temperature insulation.
- ☐ New folder on FOAMGLAS pipe insulation.
- ☐ New folder on FOAMGLAS insulation for tanks and other equipment.
- ☐ Send engineer to discuss specific problem.

Name _____

Company _____ Title _____

Address _____

City _____ Zone ____ State _____

Can you have your sugar and your *waistline*, too?

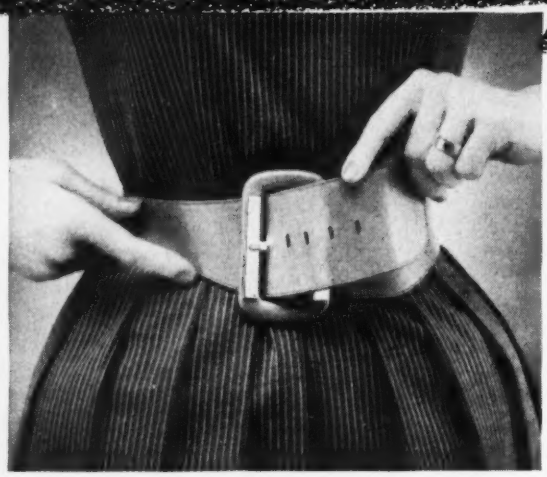
New medical research findings say yes—every healthy person can

Your appetite is what regulates your waistline

Your blood sugar level helps regulate your appetite

When your blood sugar level is low, your appetite goes up—you're apt to eat more calories than you need

When your blood sugar level is high you are more quickly satisfied on fewer calories



Here's how a sensible use of sugar and the good things containing it can raise your blood sugar level—help you stick to your diet

Research scientists at a leading university have discovered that, if you are a healthy person, your blood sugar level plays a most important part in your body's own weight-control system.

What this means to you, if your weight is normal, is that you can go right on enjoying as much sugar in your foods and beverages as you always have—without worrying about it or any other food "making you fat."

But if you are *overweight*, a moderate use of sugar in your diet may actually be *more effective* in helping you reduce than no-calorie artificial sweeteners.

Nature's "hunger regulator"

There is only one kind of calories that can make you fat. These are the *extra* calories you get when you *overeat*. And one of the most effective things you can do to help keep from overeating is deliberately to eat or drink something sweetened with sugar just before a meal, or during the early part of a meal.

The scientific reason for this, just now becoming more clearly understood, is that your *blood sugar level* acts as a hunger regulator. When it is *low* your appetite is geared up to a hearty, heavy meal with second helpings. When your blood sugar level is *high*, your appetite is slowed down to a one-helping pace.

Eating a big meal, even if it contained no sugar at all, would eventually raise your blood sugar level to the point where it would "shut off" your appetite. But the big idea is to raise it quickly—before you've already eaten too much.

Sugar is absorbed almost *instantly*—faster than any other food. That's why even an 18 calorie teaspoonful in your coffee or tea can make it easier for you to turn down several times as many calories later on.

Helps make a small meal more satisfying

There is still another reason, based on a quite different nutritional principle, why overweight people are often told to include a simple dessert in their drastically curtailed calorie allowance. It is the fact that a meal that contains some sugar has a greater *satisfaction value* than the same meal without sugar. The sense of satisfaction stays with you for a longer time, helps to keep you from getting as hungry between meals.

No "magic" short cuts to losing weight

Many people feel that using a sugar substitute or giving up their favorite dessert is all they have to do to solve their overweight problem. Actually, reducing isn't that easy, although anything that will make it easier for you to stick faithfully to your diet (as sugar can) is a big help.

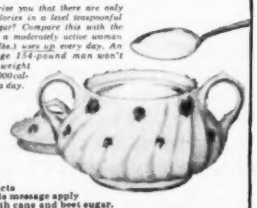
Losing weight *does* require *dieting*, and your diet should be planned by a doctor. He will tell you that there are no "magic secrets" or safe and sure "short cuts" to reducing. But follow his advice and you *will* lose weight.

You will have to eat smaller meals, but you won't have to give up any good food that is important to your health. To deny yourself sugar would be to make weight control more difficult than it need be.

SUGAR INFORMATION, INC.
New York 5, New York

18 CALORIES

Surprise you that there are only 18 calories in a level teaspoonful of sugar? Compare this with the 2,500 a moderately active woman (121 lbs.) uses up every day. An average 154-pound man won't gain weight on 3,000 calories a day.



All facts in this message apply to both cane and beet sugar.

THE SECOND AD in sugar's new campaign asks a question that's on many people's minds—and gives them the kind of answer they (and you) like to hear. Millions of people will see it, as a full-page ad, in LIFE—April 5, THE SATURDAY EVENING POST—April 24, LADIES' HOME JOURNAL for May, NEW YORKER—May 15, and LOOK—May 18. *39 BIG-CITY NEWSPAPERS* from coast to coast will also carry it the week of March 29.

For more information, use coupon on page 175.

YES

Sugar Industry's New Advertising Explodes a Nutritional Bombshell

People are still talking about the first ad in sugar's new campaign—the ad that answered the question, "What makes people fat?"

While interest is still at a high pitch, here's another—right on the same target!

Consumers are learning from this advertising something that they strongly suspected right along—that *artificial sweeteners can't take the place of sugar!*

They are gaining from it the *reassurance* to go right on reaching for their favorite foods and beverages that contain sugar.

This reassurance is based on an accurate and straightforward reporting of findings in a medical research project of fundamental importance—the fact that *sugar plays a leading role in the body's own weight-control system.*

It's a mighty effective answer to the confused calorie claims that seek to undermine confidence in quality foods and beverages that you have helped to build up over the years.

Don't you agree that this positive approach by sugar is a big step in the right direction? And as the campaign gains momentum, isn't it bound to build a greater appreciation of the sugar-containing products you make, distribute or sell?

SUGAR INFORMATION, INC.
New York 5, New York

For more information, use coupon on page 175.

Satisfaction rests on the carton

Your box is an advertising medium —en route and at the point of sale. Good design and good printing make it easier for good copy to sell merchandise. So do your container's protective qualities, which bring your product to the consumer looking its best. Shipment in a Union box is added assurance of greater point of sale impact, greater customer satisfaction.

TRADE MARK UNION
INTEGRATED PLANNING
INTEGRATED PRODUCTION

UNION BAG & PAPER CORPORATION

CORRUGATED CONTAINER DIVISION • Box Plants: Savannah, Ga., Trenton, N. J., Chicago, Ill.

Eastern Division Sales Offices: 1400 E. State St., Trenton 9, N. J. • Southern Division Sales Offices: P.O. Box 570, Savannah, Ga.
Western Division Sales Offices: 4545 West Palmer, Chicago 39, Ill. • Executive Offices: Woolworth Bldg., New York 7, N. Y.

For more information, use coupon on page 175.

COOKING KETTLES

Style C
Two-thirds Jacketed
5 to 100 gal.

Style A
Two-thirds Jacketed
5 to 500 gal.

Style B
Full Jacketed
10 to 300 gal.

Style CW
Two-thirds Jacketed
80 to 300 gal.

Pressure Kettle
Two-thirds Jacketed
40 to 200 gal.

MIXING AND BLENDING UNITS

CW3T
Center-line Scraper Agitator Kettle
80 to 300 gal.

A3T
Center-line Scraper Agitator Kettle
25 to 300 gal.

Vacuum Pan
50 to
500 gal.

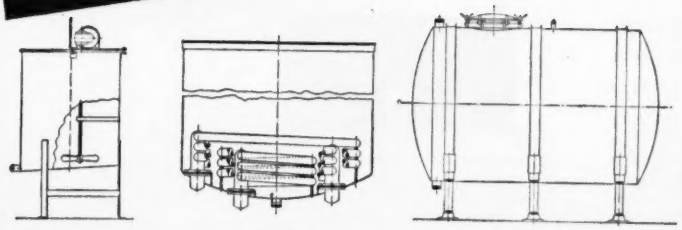
Quick Cooling Pan
50 to 200 gal.

these LEE Units WILL REDUCE YOUR PROCESSING COSTS!

Individually designed for a specific processing operation and available in a wide range of sizes to fit your exacting requirements, Lee corrosion-resistant equipment is built to give you long years of peak performance with minimum maintenance.

Descriptive bulletins are available for any or all of the above units. Write for them today and discover how Lee can help reduce *your* processing costs.

MIXING, COOKING & STORAGE TANKS



Mixing Tank
25 to 500 gal.

Pulp Tank
500 to 2,000 gal.

Storage Tank
100 to 5,000 gal.

LEE METAL PRODUCTS CO., INC.

416 PINE STREET,
PHILIPSBURG, PA.

ALL LEE KETTLES ARE MADE TO A.S.M.E. CODE

IMITATION COCONUT BY FIRMENICH

gives your products the true and complete flavor of the meat of the coconut

Your coconut-flavored products enjoy the sweetness and freshness of a newly opened coconut itself when you fortify them with Coconut Flavor by Firmenich. For Firmenich has captured this delicious flavor . . . reconstructed it for you by original research . . . prepared it for you as a precise and potent flavor material . . . of the utmost purity and stability . . . to enhance the appeal of your cake mixes, ice-cream, candy, all the foods and confections that you flavor with coconut.

FIRMENICH & CIE
SUCCESSEURS DE
CHUIT NAEF & CIE

CHICAGO OFFICE: 612 NORTH MICHIGAN AVENUE

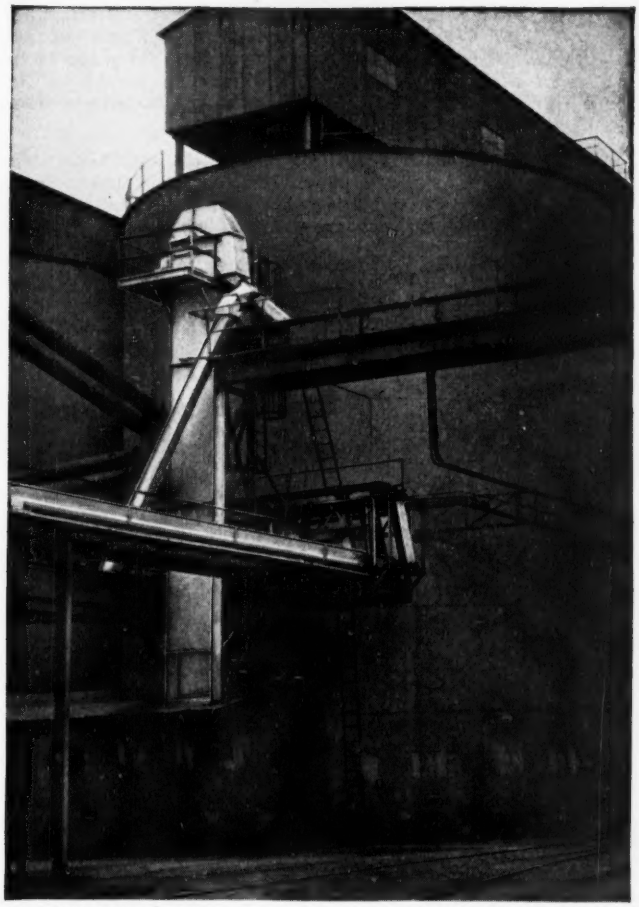
FIRMENICH OF CANADA, LIMITED, 348 WALLACE AVENUE, TORONTO

GENEVA • PARIS • LONDON

FIRMENICH INCORPORATED

250 West 18th Street, New York 11

How to lower the cost of elevating



Let LINK-BELT recommend the bucket elevator that meets your requirements from 13 types in 4 basic designs

WANT to cut your cost of raising materials to processing machinery or to storage bins or silos? Regardless of the capacity required — or the characteristics of your material — there's a Link-Belt Bucket Elevator for the job.

Working with this broad line, Link-Belt engineers can select the one best-suited to your needs. A wide range of sizes on chains or belts is available.

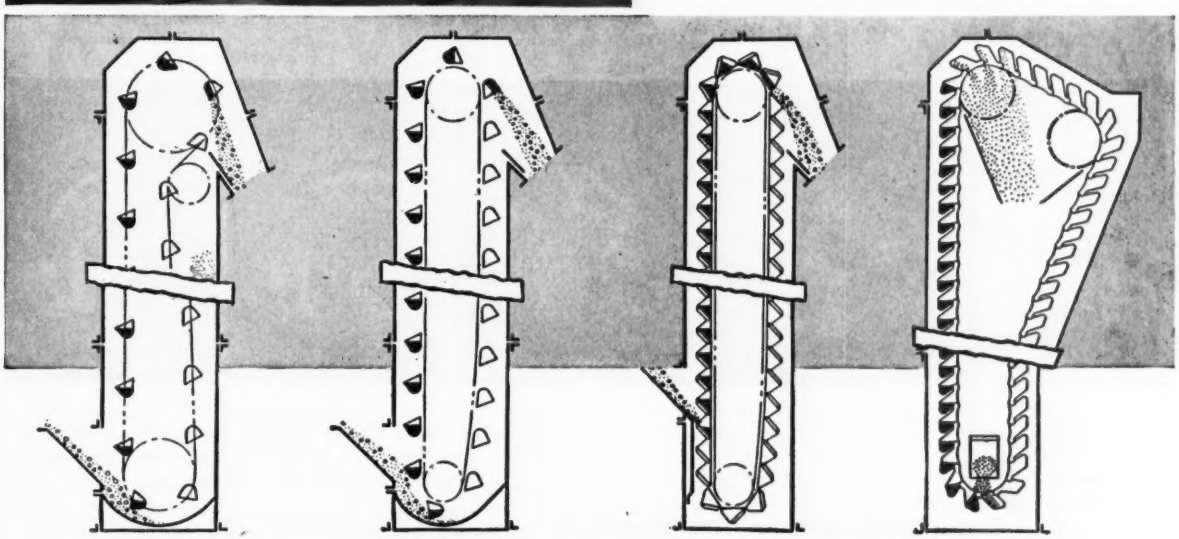
What's more, installation, maintenance and operating costs are low with Link-Belt Bucket Elevators. Rigid, jig-built casings are self-supporting, need only occasional lateral tie-ins depending on height. You have quick access to both head and boot for periodic inspections. Simple screw or gravity take-ups maintain chain or belt tension at all times.

There's an experienced materials handling engineer in the Link-Belt office near you. Call him for complete information.

LINK-BELT

BUCKET ELEVATORS

◀ Midwest soybean oil mill uses several combinations of Link-Belt Bucket Elevators and Screw Conveyors to insure smooth flow of beans throughout process.



Positive discharge
for light, fluffy, fragile or materials that tend to stick to the buckets.

Centrifugal discharge
for free-flowing, fine or loose materials with small to medium lumps.

Continuous discharge
for range of materials —light to heavy, small to large, abrasive lumps.

Internal discharge
for gentle handling of small articles such as pellets, seeds, castings.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 13,288

For more information, use coupon on page 175.

keep your lines UP...
cleaning costs WAY DOWN
with CHERRY-BURRELL
C-I-P fittings

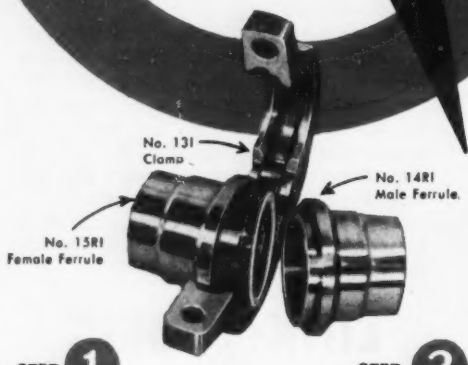
You can cut clean-up time 32 to 50% and save on both installation and maintenance with the new Cherry-Burrell stainless steel Cleaned-In-Place (C-I-P) Pipelines and Fittings.

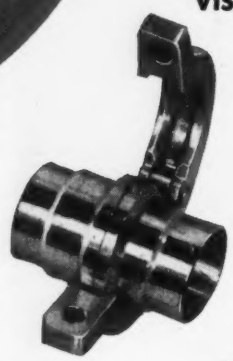
Cleaner Lines in Less Time: No time lost taking down lines. You clean them "in place" with high velocity, uniform hydraulic scrubbing. No recontamination from air borne bacteria or from handling.

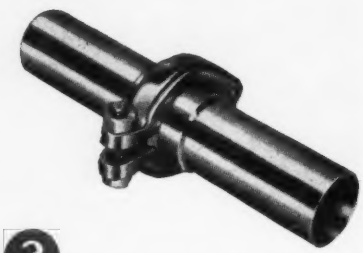
Save Installation Time and Cost: Fewer parts to handle, 21-foot pipe sections eliminate need for many unions. Vise-like strength of Cherry-Burrell union does away with pipe hangers and supports.

Less Maintenance: Lines not frequently dismantled are less likely to be dropped, dented, scored.

CHERRY-BURRELL C-I-P CLAMP FORMS VISE-LIKE UNION — IN SECONDS







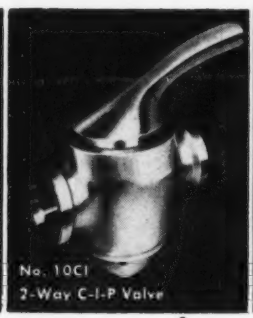
STEP 1 Self-centering "Teflon" gasket placed in female ferrule. "Teflon" gasket is non-toxic, non-absorbent, impervious to fats, acids and alkali.

STEP 2 Male and female ferrules assembled with gasket in place. Matching 37° clamping angle on ferrules and clamps. Ferrule seats machined to close tolerance. Gasket cannot get out of alignment, swell or creep.

STEP 3 Ferrules, with metal-to-metal stop, form union with predetermined squeeze point on gasket. No gasket "mushrooming." No cracks, crevices or extrusions to harbor bacteria. Tests prove this union will contain pressures up to 250 p.s.i.

typical Cherry-Burrell C-I-P fittings

No. 11CI
3-Way C-I-P Valve


No. 10CI
2-Way C-I-P Valve

No. 2CI
C-I-P 90° Bend

No. 2FI
C-I-P 90° Bend
Male and Female

CHERRY-BURRELL CORPORATION
427 W. Randolph Street, Chicago 6, Ill.
Equipment and Supplies for Industrial and Food Processing
FACTORIES, WAREHOUSES, BRANCHES, OFFICES OR DISTRIBUTORS AT YOUR SERVICE IN 56 CITIES

Ask your Cherry-Burrell Representative to show you how these C-I-P Lines and Fittings can save money in your plant. Or write for new bulletin.

CHERRY-BURRELL CORPORATION 5325
Dept. 117, 427 W. Randolph St., Chicago 6, Ill.

☐ Have Representative call.

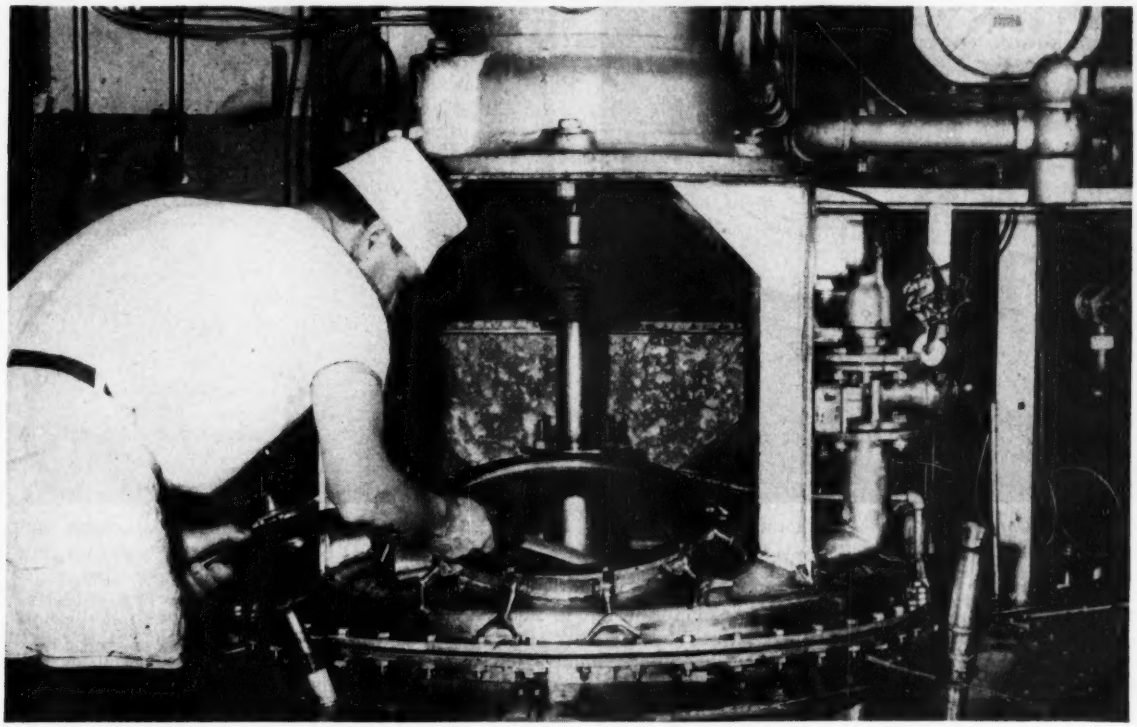
☐ Send C-I-P Bulletin G-470.

Name .....

Firm name .....

City..... Zone.... State.....

For more information, use coupon on page 175.



NIGHTLY RITUAL at Beech-Nut involves meticulous cleaning of over 180 pieces of equipment by a 30-man crew. Here, one of ten huge, stainless, baby-food cookers is being hosed after sterilizing with boiling water.

Beech-Nut's Technique Is—

TOP PREVENTIVE SANITATION

"Ever-at-it" policy assures spic-and-span plants turning out quality-safeguarded foods . . . Backing up production is stiff program of sanitary inspections and insect-control measures punctuated by thorough cleanups

EARL A. GLENAR and JOHN V. ZIEMBA

Respectively, Sanitation Department, Beech-Nut Packing Co., Canajoharie, N. Y., and Associate Editor, "Food Engineering"

Maintaining sanitation in the baby-food business is as important as maintaining black ink in the ledger. And at Beech-Nut Packing Co. plants, it's a job just as complex.

Making routine, good housekeeping inspections . . . guarding against possible entry of insects and rodents . . . adopting stainless steel, easy-to-clean machines . . . and keeping equipment and other facilities spotlessly clean are but a few of the measures scheduled in the program.

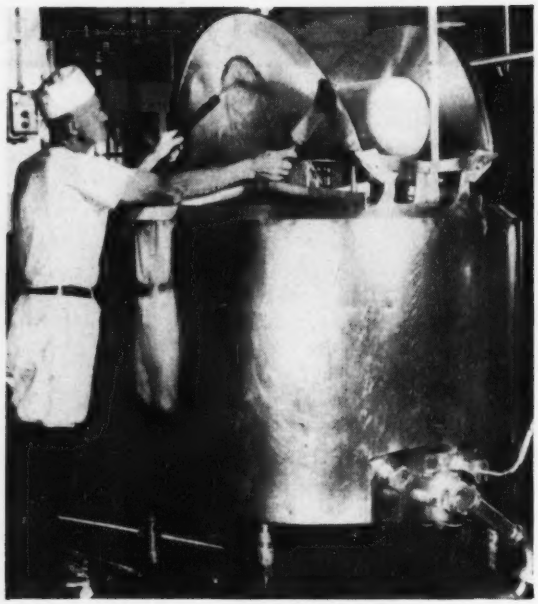
Primarily, the company's course is one of preventive sanitation. This involves waging a constant, relentless war against the possibility of product contamination. No possible source of contamination is ever overlooked. Nor is any corner-cutting even dreamed of.

Beech-Nut has adopted a bend-over-backwards sanitation program favoring the healthy proportion of baby foods in its production. No effort is spared nor too great for building and maintaining a reputation for pure quality foods that must satisfy proud and anxious parents.

Because the sanitation policy is a management function, it stresses efficient routine properly coordinated with the rest of the company's operations. Key to its success is the cooperative liaison running from top management down through supervisory personnel and production-line workers.

The sanitation department is geared for intense performance of its ever-

EASILY DISMANTLED strainer is hot-water hosed during nightly cleanup. Removable parts are separately cleaned.



STAINLESS STEEL process units, like this holding tank, were selected for easy cleaning purposes.

improved duties. Headed by a sanitarian, it is split up into four groups involving day porters, spot cleaners, department cleanup men, and a vigilant worker in charge of insect and rodent control.

In addition, there's a night crew comprising more than 30 men. It's charged with the responsibility of dismantling, cleaning, sterilizing, and re-assembling more than 180 pieces of processing equipment. These workers also mop up production-area floors as well as clean pipelines and conveyors.

Chief duty of the sanitarian is thorough inspection—in tough, unbiased manner—of three Beech-Nut plants: At Canajoharie, Brooklyn, and Rochester, N. Y. These inspections are scheduled at least every six weeks. Objective is to guard against possible contamination by living and non-living things. The checkups run in line with plant-flow. Involved are—

1. Checking raw materials to determine if they are free of contamination, properly packaged, safely stored, and constantly analyzed for evidence of objectionable, extraneous matter.

2. Inspecting production areas to see if workers are properly and cleanly dressed, machines and other accessories are clean and of sanitary design, and buildings are properly screened and rodent-proof.

3. Determining if chemicals (especially insecticides, rodenticides, germicides, and detergents) are properly selected and used—and in such a manner as to prevent product contamination.

4. Pointing out to supervisory personnel any corrective steps that must be taken—and immediately—to keep plants in a tip-top sanitary condition.

5. Issuing reports to top management and supervisory personnel—and then following up on the next inspection to learn if there has been correction of insanitary conditions or practices, should any have been noted.

Keeping the plant free of insects and rodents primarily is the task of one worker, who is responsible to the plant sanitarian. Equipped with rat traps and hand-type insect sprayer, he daily checks nonproductive areas, such as storage, shipping, offices, lockers, toilets, and recreational facilities.

This worker employs a hand-type, 1-nozzle sprayer (3 qt. capacity) that dispenses 1 oz. of insecticide per min. One filling covers 80,000 cu. ft. for flying insects or 40,000 cu. ft. for crawling insects. And he sets more than 100 rat traps in non-productive areas, then checks them twice a week.

As another control measure, six effective rodent stations are spotted along the outside of the plant. Each comprises an 18x24-ft. wooden box, with two entry holes at the bottom and two baited non-toxic traps inside each trap.

Insects Don't Get In

Aside from constantly checking incoming raw materials, six measures are taken to prevent entry of insects into the plant.

To keep out crawling insects, there is spraying once a month (except in winter, when not needed) of a repellent-type insecticide. It is ranged to a height of 3 ft. along outside walls of the plant. This insecticide consists of purified pyrethrins and piperonyl butoxide dissolved in a hydrocarbon distillate to which Lindane has been added.

Then areas adjacent to the buildings are periodically checked for gross evidence of crawling or other insects.

During fly season, three special company-designed fly traps are planted in strategic spots within 100 ft. of the plant. They are located near the garbage-disposal chute, at the extreme end of the truck-loading area, and in the truck-loading area itself. Traps are 3x3x3 ft., with fine-mesh screens nailed to wooden frames. Fly entry is at the trap's bottom, through an 8-in.-long conical screen tapering from 6-in. diameter outside to an inside, pencil-size hole. Bait used is cat food.

In addition, there are six small standard-type fly traps — specially modified in that they have gallon jars to hold attractive bait. These are located about 100 ft. from the plant and near entrances.

Still another precaution during fly season is use of overhead electric fans (16-in. dia.) that blow downward and outward through screened doorways. This discourages flying insects from getting into the plant when doors are opened.

Door and window screens also are periodically checked by the maintenance crew. Damaged and loose-fitting screens are immediately repaired.

Twice a month, the entire plant is space-sprayed with an insecticide that comprises a base of completely deodorized, highly volatile petroleum hydrocarbon, together with pyrethrins 1 and 2, plus piperonyl butoxide.

According to Dr. Arnold J. Lehman, chief, Division of Pharmacology, USDA, combinations of pyrethrins with piperonyl butoxide and n-propyl isome appear to be the safest for use from all standpoints.

Spraying is carried out only when the plant is shut down—on Saturdays from 3 P. M. to midnight. Employed is a portable, West Giant Mistorizer with a built-in compressor operating under a pressure of 80 psi. This is an 8-nozzle sprayer dispensing 8 oz. of insecticide per minute. One 15-gal. filling takes care of 2,000,000 cu. ft. of space to kill flying insects, and half that amount of space for crawling insects.

When operating this sprayer, foodstuffs are kept out of the plant so that there's no possibility of contact with insecticide. Work surfaces and equipment are properly protected. Windows and doors are closed to prevent drafts. And operators are properly safeguarded with gloves and respirators.

Also, during fly season, truck-loading and unloading docks are sprayed twice a day with a 3-gal. capacity sprayer, operating under a pressure of about 40 psi. This 2-nozzle sprayer dispenses 3 oz. of Vaposector per minute. One filling of the unit covers 400,000 cu. ft. for flying insects, and half that amount for the crawling ones.

Duties of Day Porters

Five day porters, working under a foreman, each clean daily three separate toilet, locker, and shower room facilities, as well as halls, stairways, and windows.

Toilet and wash bowls are hand-brushed with disinfectant and liquid soap, rinsed with water, and treated with a combination bactericide-fungicide-cleanser that consists of a powerful synthetic detergent combined with free elemental iodine.

Lockers are next cleansed with a wet sponge, then wiped with a liquid polish containing a disinfectant.

Floors in toilets, lockers, and shower rooms are mopped with a liquid synthetic-type detergent, then mop-rinsed with cold water. Twice a week, overhead pipes, ledges, and lighting fixtures are dusted. Windows are cleaned once a week.

Hand rails on stairways are daily sponged with a liquid soap disinfectant. Then stairs, landings, and halls are mopped with liquid soap and rinsed with water.

As for spot cleaning, there are three workers under the foreman in charge of day porters. They constantly cleanse such non-processing areas as offices and storage facilities—washing windows, cleaning light and other fixtures, disinfecting telephones, and sweeping floors.

In addition, spot cleaner operates a Tennant power sweeper in warehouse and shipping areas. This vacuum-type unit, with a 14x36-in. rotary brush, does the work of a former 8-men crew.

A 6-man crew cleans the 4-story office areas from 5 P. M. to 1:30 A. M. They sweep, polish, and wax floors, as well as clean toilets, stairways, and halls.

Porters "police" each of the production departments (chewing gum, peanut butter, strained foods), as well as the shipping and warehouse areas. For example, the one assigned to the strained foods department mops up floors and cleans up in case of any spillage. He also mops five 30x60-ft. food coolers.

Sanitary Equipment

Aiding easy cleaning at Beech-Nut has been selection of stainless steel equipment, designed for quick dismantling and reassembling of parts as well as accessibility of all parts for cleaning.

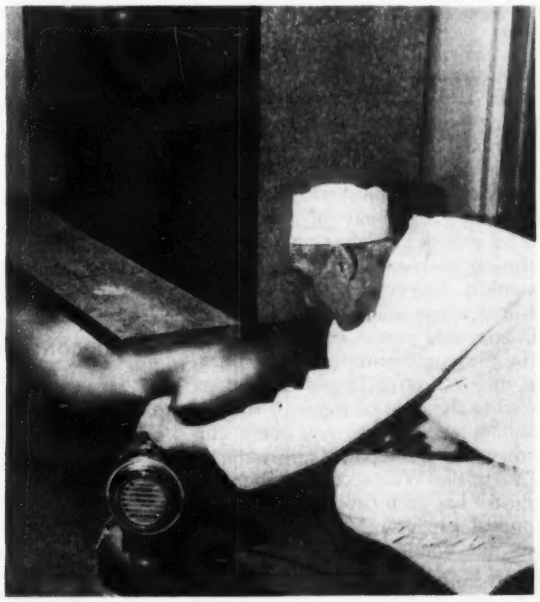
Working tables are constructed of smooth, seamless stainless steel tops with rounded corners. Cooking kettle covers are stainless and removable. Wing nuts and thumb screws have replaced difficult-to-remove nuts and bolts on equipment.

Fluids are moved from process to process by sanitary pumps and through stainless piping joined by removable coupling nuts that secure external square threads of the piping.

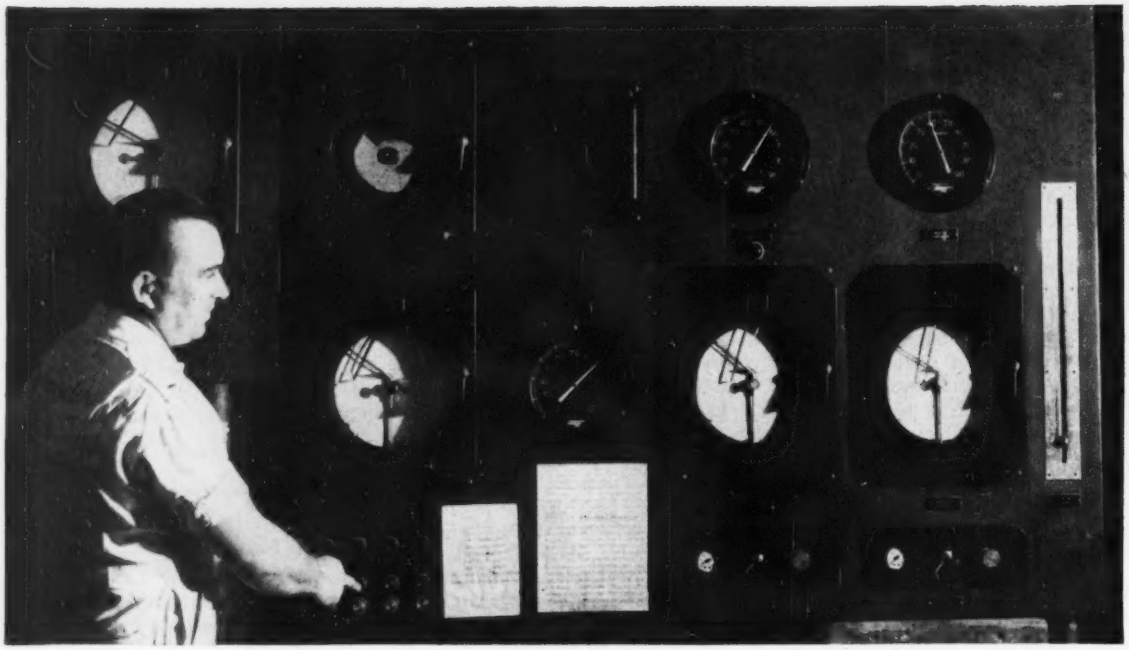
(Turn to page 168)

War on Insects Is Relentless

GIANT ATOMIZER space-sprays process areas with insecticide twice a month and over week-ends.



HAND-TYPE SPRAYER is used daily by porter in all non-processing areas in plant.



AUTOMATIC CONTROL is one of many advanced engineering features at modernized plant of San Francisco Brewing Co. On this panel are controls for malt, rice cookers, and lauter tun. Steam and air valves are operated from panel. Cereal is weighed and water metered for each brew.

Sets Fast Pace in Engineering

Saves steam, water, power. Achieves high efficiency in refrigeration, compressed air, carbon dioxide systems

JOHN J. HERZOG
Chief Engineer, San Francisco Brewing Co., San Francisco

Continual improvement in techniques and engineering keeps the brewing industry in a state of dynamic transition.

Advances in brewery engineering are made, for the most part, under the cooperative direction of the brewmaster and the chief engineer. This technical partnership aims its efforts toward a four-ringed target—highest quality, maximum capacity, greatest efficiency and utmost economy.

In the engineering phase of brewing, this objective largely can be reduced to these major elements—higher machine performance and more efficient use of heat, power and water.

Along the West Coast the brewing industry has been experiencing a phenomenal expansion. And the modernization and enlargement of old plants, as well as the construction of new ones, is attracting national attention.

When all new plants are completed, on the Coast, capacity will exceed present consumption. Then product quality and production economy will play a critical part in the industrial life of some of the well-known Western breweries. They will be faced with a highly competitive situation created by the entrance of nationally known brewers into this region. The established Western brewery faces serious modernization and expansion problems in this race for consumer favor.

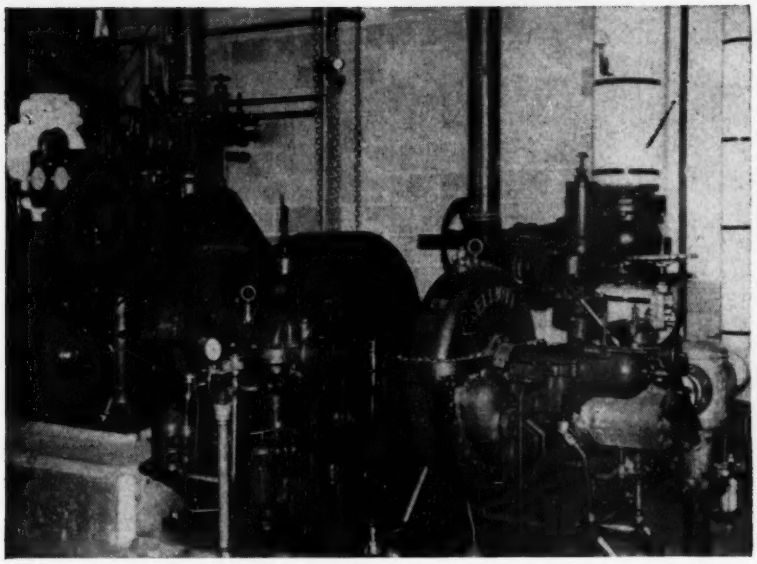
At San Francisco Brewing Co., producer of Burgermeister Beer, these growing pains have been especially severe for the engineering staff. The need for expansion, which began eight years ago, has continued without surcease, and promises to continue for some time to come.

It began with lightning-like swiftness. There was no time to produce complete plans or to consult experts in this field. There were a number of hurdles. Most serious was the problem of expanding without interrupting production. To make matters worse, the brewery is located close to the business section of the city, severely limiting the acquisition of new land.

WATER-CONSUMPTION Ratio Is Less Than 6 to 1 (Daily Figures for 1953)

	Daily Use in Gallons
120-deg. cooling water from hot wort cooler	155,000
120-deg. cooling water used for cereal cooking — 55,000 gal.	
170-deg. cooling water used for sparging lauter tun and hop strainer — 86,000 gal.	
Total — 141,000 gal.	141,000
Surplus	14,000
120-deg. water from cooling jackets of compressors	28,000
	42,000
120-deg. (40% of total) boiler feed-water make-up	32,000
For general use in office, bottle shop, warehouse, etc.	10,000

Reclaimed water from bottle washer per day — 150,000 gal.
Average daily water consumption (1953) — 720,000 gal.
Beer brewed daily (1953) — 124,000 gal.



CHEAP REFRIGERATION is achieved by this 200-hp. steam-turbine-driven compressor. Turbine exhausts to process, cutting refrigeration cost very low.

The present engine-room does not remotely resemble that in operation only 10 years ago. Then, two 40-year-old, fire-tube boilers, equipped with two well-worn feed pumps—but lacking feedwater and combustion controls—developed a total of 200 bhp. Compressed air, needed in the process, was produced by a steam-driven compressor, using for lubrication glycerine, which frequently caught afire in its discharge lines.

A twin Corliss steam engine, operating at 86 rpm. on pressures from 80-100 lb., drove one 70-ton and two 75-ton (vintage 1908) ammonia compressors. The refrigeration system was equipped with two dilapidated cooling towers. Its badly scaled shell-and-tube condenser was partly filled with lubricating oil resulting in compressor head-pressures up to 260 lb. A compressor having a length of 2-in. pipe serving as a connecting rod was the heart of the CO_2 system.

Transition from an obsolete to a modern power plant continued with gradually increasing tempo until about three years ago. Consumer demand then began to outstrip production. So the modernization-expansion program was hard put to keep up with sales.

Steam Does Double Duty

The new power plant is equipped with three 1,000-bhp. Sterling boilers operating at 150 psi., one being a standby. Fuel is natural gas, with standby oil. Automatic feedwater and combustion controls assure efficient operation.

Steam goes first to two turbines, at 150 psi. and at a rate of 50,000 lb./hr. One of these turbines, a 40-hp. unit, powers one of two boiler feed-water pumps. A second pump is driven by a 25-hp. electric motor. The other turbine, a 200-hp. unit, drives an 8-cyl. 6¾ x 5 in., VW-type refrigeration compressor.

Now reduced to 10-20 psi., according to steam demand, the exhaust steam from both turbines supplies heat for the brewing process and these facilities: (1) A 75,000-lb./hr. deaerating heater, which delivers 235-deg.-F feedwater to the boilers. (2) An instantaneous hot water heater. (3) The CO_2 vaporizer. (4) Air conditioning in the plant and offices.

Approximately 15,000 lb./hr. of 150-psi. steam, reduced to 70 psi., is used in the malt and rice cookers and the lauter tun. The rice cooker is a closed vessel operating at 10 psi.

Condensate return from these units is negligible compared to that of the brew kettles. The 30 psi. steam demand for the kettles is approximately 14,945 lb./hr. This heats an upright, open-end type of shell-tube percolator.

Wort is brought to a rolling boil, so important in this part of the brewing process, by the action of this percolator. The wort enters at the bottom of the tube sections and exits at high velocity at the top, creating the turbulence.

Because of the quantity of condensate from the kettles, each unit has a condensate receiver and a pump that returns the condensate to the deaerating heater. The remainder of the steam generated is used in pasteurizers and bottle washers in the bottle shop.

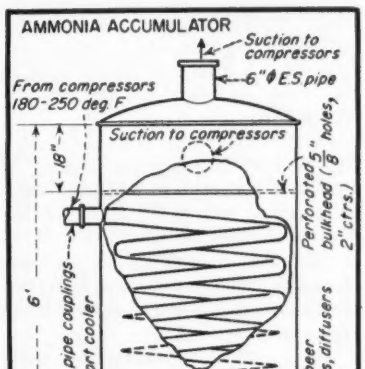
Forty percent of the boiler feedwater is pumped from the surplus 120-deg. hot-water tank through a water-softener and a heat exchanger, the latter being heated to 180 deg. by continuous blow-down from the boilers. Returned condensate supplies the balance of the total 35,000 gal./day make-up water for the boilers. Make-up water is heated and purged of air in the deaerating heater. Turbine exhaust steam, maintained at a constant 5 psi. by a back-pressure valve, raises the temperature of this water to 235 deg. before it is fed to the boilers by the feed-pumps.

Steam demand of the 450-gpm., instantaneous hot-water heater varies according to process demands for 170-deg. water. It is heated by turbine-exhaust steam and delivers water at a temperature always higher than 170 deg. Lacking demand for hot water, the steam valve of this unit is automatically closed.

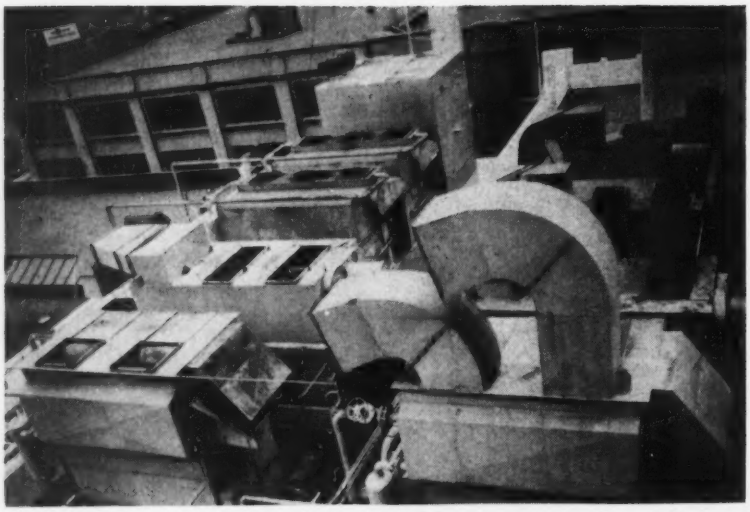
Steam is supplied only on demand from automatic controls to the liquid CO_2 vaporizer and to the heating and air conditioning system.

Conserves Water and Btu.'s

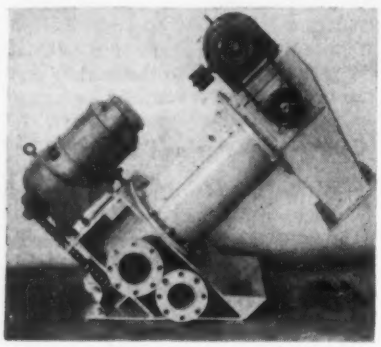
Water at 60 deg. is supplied through two 6-in. city water mains. The water comes from San Francisco's Hetch-Hetchy Project in the High Sierra Mountains, and it is ideal for brewing. Water supply is stored in two 20,000-gal. cone-shaped tanks. These serve as settling-tanks and also provide an even flow of water to the brew and stockhouses. All supply



INNOVATION in refrigeration is this heated ammonia accumulator. Coil vaporizes liquid or saturated gas to protect compressors.



EFFICIENCY in refrigeration also is assured by these evaporative condensers, which reduce ammonia-gas temperature from 250 to 50 deg. to liquefy it.



LABEL GRINDER (patent pending) chews up labels removed from soaker so they may be pumped to waste.

lines lead from these tanks above the cone. Any sediment collects in the bottom of the cone and is periodically removed. A 6 in. line, at the apex of the cone, connects to the building fire system.

Most of this water is used for cooling hot wort in a heat exchanger. At a ratio of 5 to 4 (5 gal. of cool water to 4 gal. of hot wort), this unit has high heat-exchange efficiency. Wort at 200 deg. is pumped at the rate of 12,400 gph. into the water sections of this exchanger and is cooled to 80 deg.

There are 12 counterflow shell-and-tube water sections. The hot wort enters the last, or warmest, section and exits at the coolest, 85-deg. section, from which it then passes to the ammonia-refrigerated section. The latter, comprising four stainless shell-and-tube units, cools the wort to 55 deg. before it is pumped to fermenting tanks. Back-pressure to compressors, which is at 55 deg., regulates temperature of outgoing wort.

Water exits from this cooler at about 125 deg. and is stored in five 30,000-gal. tanks. Excess overflows to the surplus 120-deg. water storage tank. Cooling water for the compressors in the engine room, heated by this wort to 120 deg., also is stored here.

Prior to 1950, the water in these tanks was heated by steam injection to 170 deg. and stored for process use. However, process demands required water at both 120 deg. and 170 deg., so the temperature of a large part of this stored supply had to be knocked-down by addition of cold water. This inefficient phase of the heat balance has been eliminated by the installation of an instantaneous heater.

In the present system, water from the wort cooler is stored at its exit temperature of 120 deg. Approximately 55,000 gpd. are reheated in the instantaneous steam water heater, then drawn off through a mixing valve that automatically delivers water at 170 deg. for sparging cereal and hops in the lauter tun and hop-strainer. Thus the new system heats only that water demanded by the process to the higher temperature of 170 deg., and only on process demand.

Final cold-water rinse in the bottle washer is reclaimed. This practically clean water is filtered through a fully automatic Cuno mechanical filter and pumped to a 20,000-gal. storage tank on the roof of the building. About 150,000 gpd. are recovered and, from the tank, used to provide all cooling water in the bottle and can pasteurizers. The product being safely sealed in glass or tin containers, none of this water comes in contact with it.

The amount of cool rinse water derived from this source balances usually with the demands for pasteurizer cooling water. If more water should be required in this section of the pasteurizer, that used in the last cooling section of this unit, and normally wasted, can be recycled through the system.

Ratio of gallons of water to that of beer brewed is of economic importance to all breweries, even though they have their own artesian wells. An average of 8 gal. of water to 1 gal. beer brewed is usually considered quite efficient. In some breweries, where water supply is cheap and plentiful, this ratio will run as high as 20 to 1. Usually, such breweries own their wells and draw unstintingly from them.

Where water costs are relatively high, it is necessary to economize on this vital brewing ingredient, which also is used as a process cooling-heating medium. At Burgermeister, the ratio has been reduced to 6 gal. of water to 1 gal. of beer brewed (see table).

Cuts Refrigeration Cost

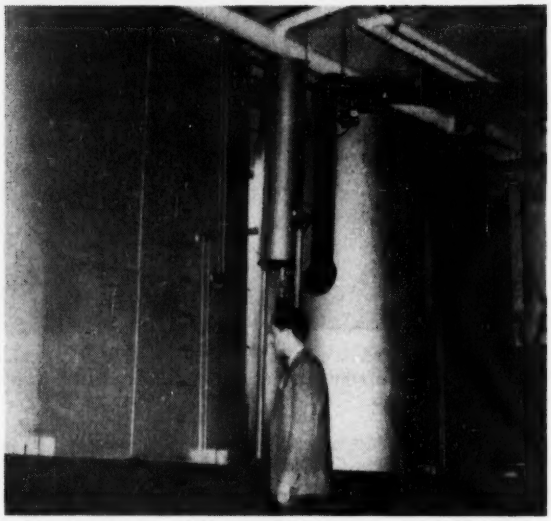
Refrigeration is produced by six ammonia compressors varying from 50 to 100 tons of refrigeration capacity. Total refrigeration is 1,000 tons. The most recent unit to be added to the engine room is the steam-turbine-driven 8-cyl. 6¾ x 5-in. VW compressor. In addition to electrical power economy, this unit has several other advantages when compared, in this engine room, to other compressors driven by synchronous motors.

This turbine-driven unit has been in service for six months, and the results prove that low-pressure steam-driven refrigeration compressors can be employed to advantage in brewing. During this period, fuel consumption for steam generation has increased only 1%. However, for the same period, the maximum kilowatt demand decreased by 7%, the power factor remaining at 99%.

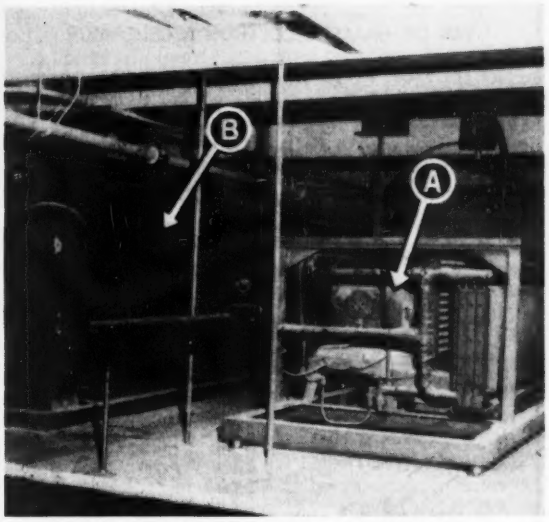
In addition, during the period of brewery expansion, transformers had to be enlarged three times. Originally there were three 100-kw. units. Present power demands require three 1,500-kw. transformers. However, this

(*Turn to page 220*)

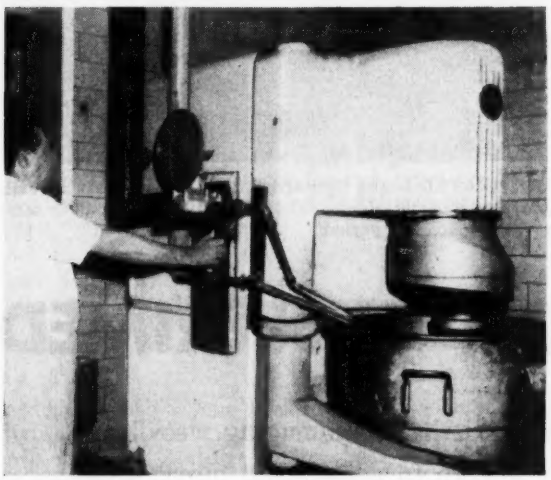
FOR A "BLUEPRINT" of the efficient energy system at San Francisco Brewing Co., turn to the foldout flowsheet on pages 118-121. Pointers for all types of food processors will be found in this graphic presentation.



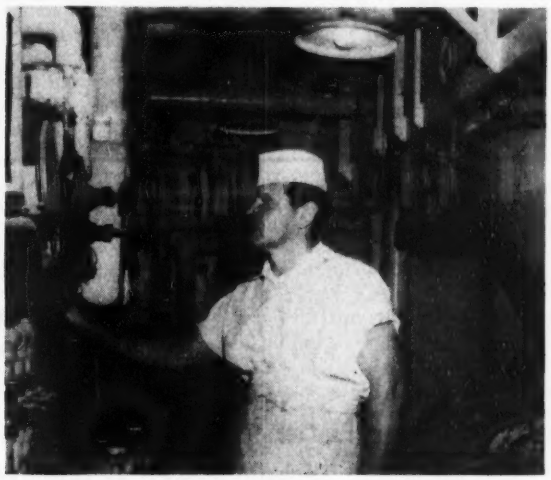
FROM these 3,200-gal., plastic-lined storage tanks at the Fischer bakery, liquid sugar is pumped to . . .



. . . **HEAT-EXCHANGER** (A) to be cooled to 50-55 F. Cooled syrup goes to 120-gal. surge tank (B), then to . . .



. . . **METER** and into 340-qt. vertical batch mixer for preparation of 70-deg.-F. cake batters . . .



. . . **OR TO METER** feeding three bread-dough mixers. Dough temperature is easily kept at desired 81 F.

Liquid Sugar Cools Dough

Chilling of sweetener assures uniform-quality breads, cakes. Syrup saves space, money, labor, cleaning

CHARLES WALKER and FRED SCHOEN, JR.
Respectively, Cake Production Superintendent and Chief Engineer, Fischer Baking Co., Asbury Park, N. J.

Pre-cooling and then metering of liquid sugar into mixers is another pioneering progress chalked up for the baking field.

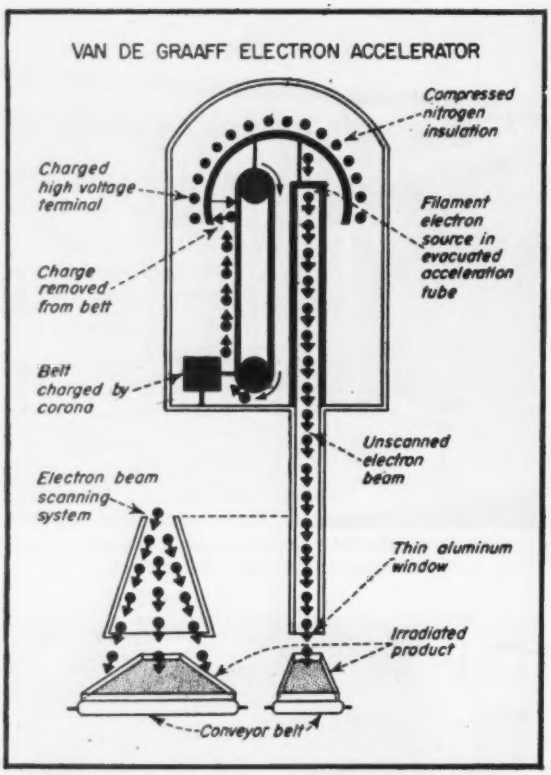
A few years ago it was first used to obtain more uniform quality cakes (FE Oct. '51, p. 102). And now we are using it to prepare properly developed bread doughs.

Already, the liquid sugar cooling-and-recirculating system has solved our cake batter-temperature problem. We have speeded preparation of cake batters in three 340-qt. mixers–and with less labor. But more important, we are now baking cakes, during winter and summer, that are uniform in size, grain, and texture.

Now it's proved to be the solution to our bread-dough problems. By metering cooled liquid sugar into our three mixers, we are to obtain the desired mixing time–and without using shaved ice. And since the entire system is closed, it is sanitary.

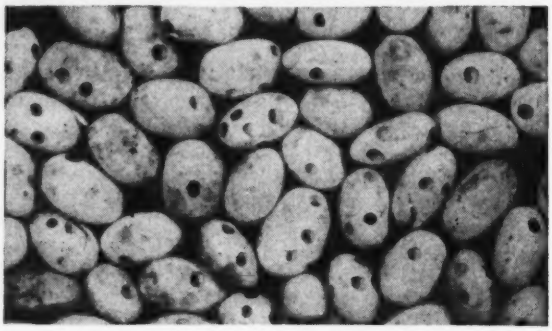
In our former use of granulated sugar (in 100-lb. bags), cost for ice needed to keep dough temperature at 81 deg. F. ran about $100 a week.

(*Turn to page* 199)



HOW product was targeted by beams from 2,000,000v. Van de Graaff unit. As indicated, conveyor belts could be set up for continuous treatments.

TREATED beans that were artificially infested with bean weevils showed no signs of infestation 43 days after exposure to 100,000 rep.



UNTREATED beans similarily infested with bean weevils provided a check. Near-total damage is apparent after same 43-day incubation period.

ELECTRON GUN AIMED

Test irradiation of grain and flour proves lethal to damaging weevil and beetle . . . Technique seen as possible new curb to widespread insect losses

VERNON H. BAKER, OSCAR TABOADA, and DENNIS E. WIANT

Respectively, Research Professor, Agricultural Engineering Department, Virginia Polytechnic Institute; Advanced Graduate Assistant in Entomology, Michigan State College; and Professor of Agricultural Engineering, Michigan State College

While food processors are rightly excited by possibilities of electron beams in "cold sterilizing" packaged products, another application of irradiation may offer even more significant gain.

This is the use of accelerated electrons for controlling the ravages of insect infestation in bulk-stored dry foods.

It is estimated that insects dine yearly on over $300-million worth of American grain products alone. So any vital step to reduce this loss could spell immediate and profound savings.

Very hopeful signs came to the fore in recent grain irradiating tests made by the Agricultural Engineering, Entomology, and Home Economics Departments at Michigan State College, in cooperation with The Upjohn Co., Kalamazoo. Using a Van de Graaff generator, samples of both wheat and flour—contaminated by various insect life—were exposed to accelerated electron beams.

And it was discovered (1) that adult granary weevils and flour beetles—two of the worst pests—could be exterminated by irradiation; (2) that surprisingly low doses sterilized the eggs of these insects while, at the same time, effectively holding the adult from further reproduction.

Probably the most common infestation, grain weevils and flour beetles, by their very fecundity, lent themselves well to our studies. For both these insects develop from egg to adult in about a month, live up to one year, and may lay over 500 eggs.

To get typically infested samples for irradiation, a definite number of insects were placed with a weighed amount of product on a dish. This was then incubated at constant temperature and humidity to encourage optimum egg laying. Then, most of these samples were exposed to varying dosages of accelerated electrons, with some left untreated as controls.

"Electron Gun"

The accelerated electrons produced by the Van de Graaff generator (known as beta particles in nuclear physics, and as cathode rays in the TV tube) literally are shot at the

TREATED wheat was artificially infested with granary weevils, then exposed to 100,000 rep dosage. No damage was noted after 43 days.

UNTREATED wheat received similar infestation with weevils and, as seen above, showed widespread insect damage after 43 days.

AT INSECTS

product through a long evacuated tube which may be likened to a gun barrel. Hence the term "electron gun".

In operation, a charge up to about 2,000,000 v. is accumulated in the insulated metal dome of the Van de Graaff generator. This potential accelerates the electrons emitted from a hot filament down into and through the long vacuum tube of the accelerator. The resulting electron beam approaches the speed of light in passage through the tube and out its thin aluminum exit window onto the target below.

Applied dosages of electrons were measured in rep (roentgens equivalent physical). A very small quantity of energy, the rep may be defined in terms of calories or kilowatt-hours. A dosage of 100,000 rep is equal to about 0.20 calories per gram—meaning it will raise the temperature of a 1 g. sample of wheat or flour about ½ deg. C. A dosage of 500,000 rep would raise the same sample about 2½ deg. C.

During tests, the infested samples of grain and flour were held, in their respective dishes, under the Van de Graaff target window, to receive dosages varying from 10,000 on up to 500,000 rep. These samples were then examined for insect and egg viability and the irradiated product later evaluated in germination and baking tests.

Effective Kill

Results of the first tests showed that 80% of adult granary weevils died within one week after exposure to a dose of 100,000 rep. However, a 250,000 rep exposure was required to be mortal to 90% of the adult flour beetles in the same time.

Complete kill, immediately after treatment, was obtained with 250,000 rep for the granary weevil and 500,000 rep for the more resistant flour beetle.

For practical purposes, dosages much lower than mentioned above may be adequate for insect control. Other data indicated that a dose as low as 10,000 rep will sterilize both granary weevil and flour beetle eggs already laid, and that the same dosage prevents adults of these insects from reproducing.

In subsequent tests on the irradiated whole grain it was discovered that treatment definitely damages wheat for use as seed. On receiving a dosage as high as 500,000 rep, seed will sometimes germinate, but will not emerge and grow when planted. Wheat plants from seed receiving the egg sterilizing dose of 10,000 rep are definitely retarded in growth.

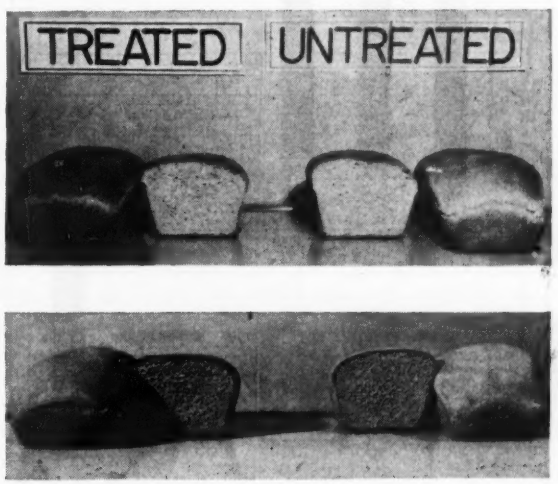
Preliminary baking and taste tests, conducted by members of the Home Economics Department, showed that a satisfactory loaf of bread can be made from irradiated wheat flour—even when extra-high dosages were used for immediate killing of all insect life. Some differences were noted in tenderness, flavor, and moistness, as compared with bread from the same flour untreated. However, some testers actually preferred bread made from treated flour.

Further baking and taste tests are planned with reduced dosages. And definite conclusions cannot be reached before the results of these tests are known.

Other Effects

Results of accelerated electrons on vitamins has been studied by Dr. B. E. Proctor and his associates at Massachusetts Institute of Technology. Their data indicated that there was no appreciable destruction of niacin and carotene in a concentration of 100 micrograms per ml when treated with a dose of 10,000 rep. There was also about 95% retention of riboflavin with the same dilution when treated with a dose of 100,000 rep.

When accelerated electrons are used to sterilize foods, there may be produced certain side effects that can cause changes in color, flavor, and sometimes texture. Broad studies currently are underway in an effort to curb these



AND IN LOAF, little change was noted between products made from treated and untreated wheat. Top: Bread baked from 75% whole wheat, 25% white flour. Above: Loaves from 100% whole wheat flour. Treatment was 500,000 rep.

changes. It has been found that irradiation of materials in inert atmosphere or under vacuum and in the frozen state minimizes, but does not prevent, these effects.

In reality, the biological and chemical effects of accelerated electrons are much the same as those imposed by X-rays and gamma rays. No induced radioactivity is produced in the product at irradiating potentials below 21,000,000 v.

While penetration of accelerated electrons into matter is less than that of X-rays of corresponding voltage, the relative penetrating value of this type of irradiation is enough to make it a considered technique.

Our calculations indicate that a depth of about ⅜-in. of wheat or flour can be effectively treated with a 2,000,000 v. machine. Projecting this, a ¾ in. depth could be handled with a 3,000,000 v. generator, and almost an inch layer of product could be irradiated with a 5,000,000 v. machine.

Naturally, all of our samples were treated in small dish-held batches. But continuous irradiation—of prime interest to the practical miller—undoubtedly could be set up easily, with a proper feeding mechanism and continuous belt passing below the electron stream. Width and speed of conveyor belt could be adjusted to give various process rates, provided the machines used were equipped with sufficient electrical capacity to supply the desired dosage.

Costs and Future

In practical production rates, it is thus theoretically possible to treat up to 3,800 lb. of wheat or flour per hour with a dose of 100,000 rep. using a 2,000,000 v. generator. This could be upped to 38,000 lb. per hour using the less-lethal 10,000 rep dose. However, it is believed that a rate of 10,000 lb. per hour may be satisfactory in many installations.

In terms of actual operating costs, the technique also looks practical. Assuming a rate of 2c. per kilowatt-hour and a dose of 100,000 rep with an overall efficiency of 10%, this cost would be $0.15 per ton. This would be reduced to $0.015 per ton with 10,000 rep treatment.

However, it must be remembered that the major cost to be considered is that of the actual installation—first cost.

Equipment now in use primarily was designed for experimental purposes and involves a rather high investment. Naturally, future equipment costs may be greatly reduced if a number of such machines can be built to treat food products.

Another advantage of processing with electrons is that such treatment can be very positively metered and should permit excellent process control.

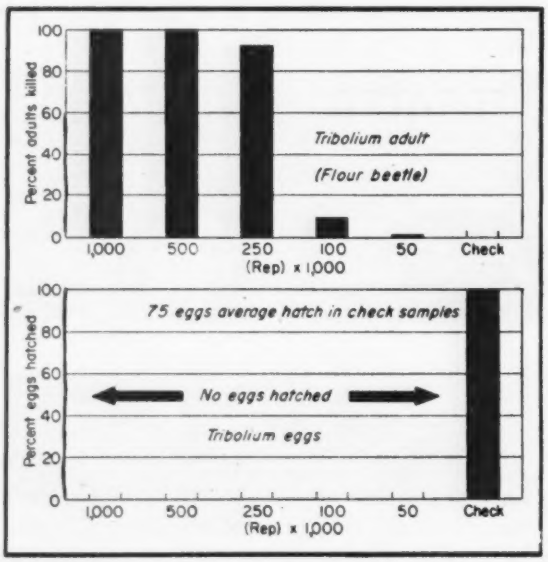
May Prove Revolutionary

If satisfactory processes can be worked out, electronic sterilization may well revolutionize conventional food manufacture. However, much further research is needed—and some now is in progress—on the effects of accelerated electrons on the baking, keeping, and nutritional properties of milled products.

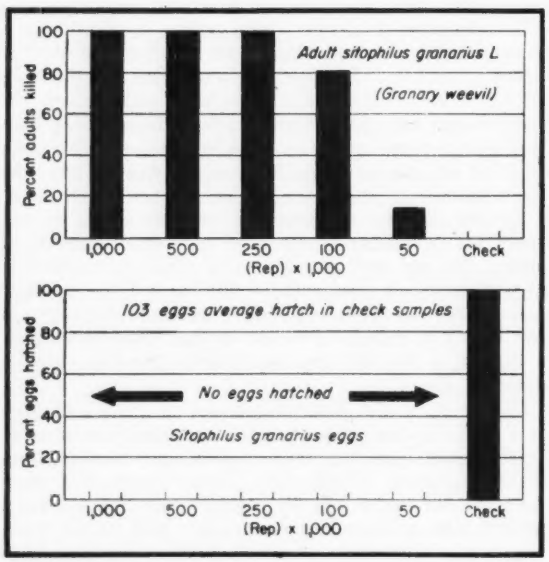
In the not-to-distant future, perhaps grain products can be treated with electrons before storage, and milled products before packaging, to eliminate or reduce the ever-present and staggering problem of food losses due to insect life.

The above article summarizes a paper presented at the meeting of the American Society of Agricultural Engineers in Chicago, Dec. 7-9, 1953, and was sponsored by the ASAE Committee on Agricultural Processing. Operations related were carried out in advanced-degree work at Michigan State College. Part I of a more detailed report was published by the authors in Nov. '53 "Agricultural Engineering."

Acknowledgments: The authors wish to thank Dr. Margaret A. Ohlson, Miss Mary L. Moor, and Miss Marcille Pridgeon, of the Department of Foods & Nutrition of Michigan State College, for conducting the baking tests. Special acknowledgment is also due Messrs. O. R. Woods and N. A. Drake, of the Physics Department of The Upjohn Co., and The Upjohn Co. itself for use of its Van de Graaff generator.



FLOUR BEETLES killed within a week after irradiation (top chart) indicate 500,000 rep as most effective treatment. Second chart shows that no eggs hatch 43 days after various dosages.



GRANARY WEEVILS succumbed completely (top chart) to 250,000 rep within one week after exposure. Second chart indicates lethality of various treatments on egg viability after 43-day incubation period.

More on the Sphere of

THE TECHNICAL MAN

How he can pull most weight as part of a well-coordinated company team.

A sequel to the thought-provoking article in the November issue of FE

OTTO W. LANG
Consultant in Food Engineering, Atherton, Calif.

Only through elimination of differences between management and the technical man will permanent benefit come to food companies so affected. That is why thoughtful attention is merited by the comments of Roy E. Morse, in the article "The Technical Man–His Woes, His Weaknesses, His Way to the Top" (FE Nov., 1953, p. 96).

In the first part of that article, Dr. Morse discussed the heavy turnover of personnel, the small investments allocated to research, and the technical man's inability to find his place in the company. Then his second part dealt with the shortcomings of the technical man, his feeling of isolation from the rest of the company, his lack of resourcefulness and, in short, his misdirected efforts.

Let us, then, re-examine the problem which Mr. Morse has so ably stated, with the aim of supplementing his observations.

Faulty Teamwork

It would appear that most of the differences are the direct result of misunderstandings, lack of integration of departmental functions, or failure to correlate the duties of these departments to the best interests of the business. It is doubtful if management, production, and technology have fully recognized the potential benefits of real joint effort. And in cooperation appears to rest the crux of the matter.

The results of observations and experiences given here are not designed to vindicate the technical man, nor to cast aspersions upon management. Rather, the intent is to obviate situations disliked by management and to suggest how the technician may be employed to the best interest of his company.

Both the technical man and management should recognize their respective limitations. We will point out some of them. They are none too pleasant–nor are they designed to be pleasant. Only factual and realistic appraisement, rather than wishful thinking, solves any dilemma.

Obviously, there always are exceptions to any rule, depending upon differences in the conditions and situations. In general, however, the majority of comments will apply.

Let this be said at the very outset: There can be no room for prima donnas or malcontents in any phase of business operation.

Has Had Free Ride

That there is a definite place for the technical man in the food industry is all too evident. Compare with the present practices those of the past one to three decades–when the technician was comparatively rare or non-existent.

Aside from the very small expenditures allocated for research, and with few exceptions, the food industry up to now has received a free ride from so-called free agencies. Like it or not, it must be admitted that the Food & Drug Administration, as well as various public health agencies, have contributed their share by being instrumental in diverting nuisances into useful byproducts, or by improving the product itself.

In the not too distant past, the junk yards have been a thriving burial ground for jerry-built equipment. For production-line equipment built without first taking into account the diverse pitfalls.

Need for a solution to such problems, plus the fact that quantities of products often ended at the city dumps, instead of on the grocers' shelves, no doubt prompted the employment of the technical man in the food industry. Here, the problems were self-evident and the need for the technician was obvious.

Management Must Steer

As the governing head of a business, management is in a position to coordinate the various departments of the company into a smooth-functioning team. But it is only through close contact with his respective departments that the company executive can accomplish this effectively.

Food Technology is a fact-finding occupation. It applies fundamental tools, supplied by the sciences, to the solution of a problem–or to a more comprehensive understanding of the various steps in a process. It goes even further by attempting to explain certain so-called mysteries heretofore classified as an art. In summary, the functions of the technical man and his department may be considered as education, control, and improvement.

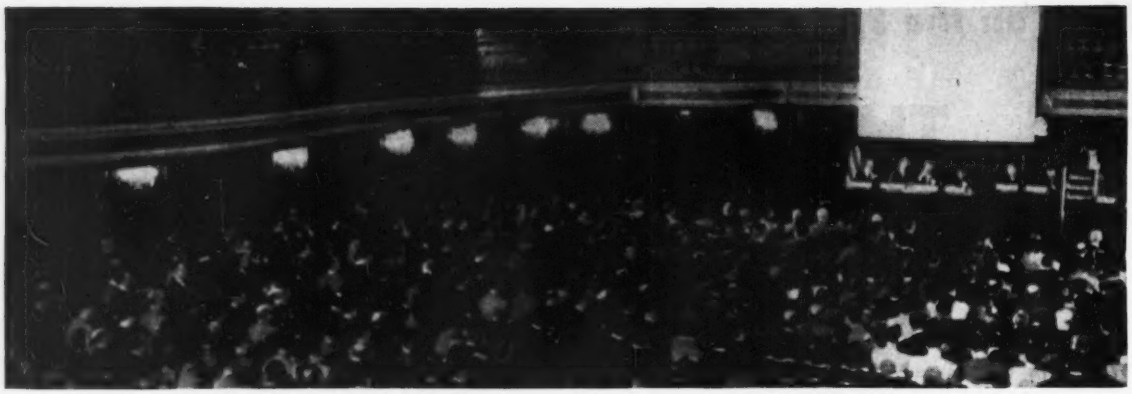
Because the food field is so diverse and varied in its products, it is quite logical to suppose that very few technically trained persons can be acquainted with all intricacies of plant operations for producing various foods. This is predominantly true for those just out of college.

Production methods often vary among companies producing competitive items. Consequently, an intensive training period in factory methods should supplement their fundamental knowledge, since it is only through intimate knowledge that a process can be improved. And the tech-

(*Turn to page 150*)

About the Author

Otto W. Lang is a well-known food engineer on the West Coast. He did outstanding research on fish processing and was in charge of the fish section of Hooper Foundation. He headed the research department and laboratory of Pacific Can Co., and is a past chairman of his local chapter of the Institute of Food Technologists.



Experts at AMA Personnel Conference Bring You—

Practical Labor-Issue Pointers

Tell what to watch for as unions press for risky **guaranteed annual wage,** and the more bothersome **fringe benefits.** Offer tips, too, on **Taft-Hartley**

IVAN C. MILLER
Associate Editor, "Food Engineering"

Critical areas in present-day personnel relations were spotlighted before 1,800 representatives of management, labor and government at the recent Chicago conference of the American Management Assn.

And here, to guide you in your own labor relations, is a highlight report of pertinent points scrutinized at this significant national gathering.

Grappling With GAW

For several years demands of some unions, during contract negotiations, for a guaranteed annual wage have been poorly planned, though ambitious pry-bars to obtain less drastic concessions.

This year's demands, more carefully planned, will have a dual purpose. And since guaranteed annual wage demands will be more realistic, at least some unions will hope to force acceptance, even though the result may be little more than "getting a foot in the door". With this accomplishment in the bag, they will then expect upgrading in the future, until optimum level is reached.

These unions are seen driving hard for a GAW, realizing that the likelihood of wage-rate increases this year are limited. Pressure for wage guarantee may at least drive a wedge for additional fringe benefits. And, according to C. Wilson Randle, authority on collective bargaining, "Present indications are that guaranteed annual wages are even more bargainable than pensions—an issue of bargainability already settled."

There is reason to believe that regardless of the apparent determinations of unions, much of the GAW "push" will be showmanship. The reasons: Union members are not strongly behind the demand, since to them immediate tangible gains are more to be desired than future intangibles.

Therefore, management may expect pressure for the more enticing benefits—liberalized pensions, additional vacation time, non-contributory insurance, frozen cost of living gains, and the usual direct wage increases—as likely substitutes for the guaranteed annual wage. This emphasis, of course, can shift if general business activity lags further, with a consequent threat of considerable unemployment.

Repercussions

As defined by Dr. Sumner H. Slichter, Lamonte Professor, Harvard University, "The traditional meaning of a guaranteed annual wage is that employees covered by the guarantee will be given a minimum amount of work each year and will not be dropped for lack of work without a year's notice. The guarantee may or may not specify a wage rate."

No employer can afford to pay for much labor that is not performed, or that is not worth to him what he pays for it. Hence, a guaranteed annual wage of the traditional type presupposes that the employer can control in considerable measure the number of jobs in his plant.

The type of GAW defined above may be met by some successful enterprises in non-cyclical industries, such as a few of the food branches. This is the case with most of those companies that have in the past adopted a guaranteed annual wage on their own initiative. Generally, these businesses are subjected to seasonal rather than cyclical employment fluctuations. In these operations known and anticipated seasonal ups and downs mostly can be alleviated by such a device as stock-piling inventory. It should be noted, however, that adoption of any GAW plan intensely increases the business risk and the responsibilities of management.

In theory, at least, it might be that if guaranteed annual wage plans were adopted on a fairly wide scale it would be possible so to stabilize the total volume of employment that no large unearned payments would be necessary. But this, of course, would hinge on employers accumulating sufficient reserves to meet the required wage payments, while having their liability limited to the amount of the reserves.

Without these safeguards general adoption of the guaranteed annual wage would not stabilize employment. On the contrary it would dangerously aggravate the severity of depressions.

With reserve funds and limited liability, widespread use of the guaranteed annual wage might help to sustain consumer income in periods of dropping employment. It would not, however, necessarily limit the tendency of prices to rise in periods of expansion.

Current union proposals essentially are similar to the traditional guaranteed annual wage plans, with the addition of reserve funds in limited liability. But instead of a guarantee of actual employment, the unions plan to ask for benefit payments to laid-off employees to supplement unemployment compensation payments.

The union plan would be less effective than the traditional one in sustaining personal income during the early stages of a recession. However, under this plan reserve funds would be exhausted less quickly and personal income would be maintained better after about a year or two of "bad times".

For prosperous companies in relatively non-cyclic industries, the traditional type of guaranteed annual wage plan would be better than the current union proposals. For weak firms and for cyclical industries, supplementary unemployment compensation of the type suggested by the unions would be preferable. This would interfere less with the movement of labor out of depressed industries, and it would also be more likely to give workers in cyclical industries some income right through the recession.

Be Prepared

One sad commentary on human nature must be faced when considering the plan of unions to force management to assume sizable unemployment compensation payments from reserves set aside by the company. Past experience with government unemployment compensation has proved that even on meager allotments, many laid-off workers prefer to rock along on little income rather than work for more. To increase measurably the allotments is to intensify this problem.

And, of course, establishing a reserve is in fact an increase in wage even though payment is deferred. Whatever the amount, the cost must come out of profits or be passed on to consumers with inflationary results.

It is essential that management meet this year at the bargaining sessions fully armed with all the facts on GAW and also additional fringe benefits. In view of the already heavy burden of the latter, management must understand these things: The problem of integrating such a program with unemployment compensation, the proper level of guaranteed pay, tax implications, and the permanency of the commitment.

Recessions and depressions likely would force wages down. However, fringe benefits are unlikely to be affected. In many food plants today, fringe benefits account for as much as 20% of total compensation to employees, in some even more. Should the wage rate go down, the percentage of compensation represented by fringe benefits becomes greater.

Recommended by Mr. Randle, in view of probable union demands, is policy rather than defensive action. The first step, he said, includes a thorough study and analysis of company turnover, production schedules, financial liabilities, product diversification, and the like, aimed at providing background for two major decisions: (1) How far can management go in contracting a guaranteed annual wage liability? (2) To what degree can management stabilize production (or unemployment) so as to reduce incidents of unemployment liability? Production stabilization, of course, can be justified on its own and without regard to the guaranteed annual wage.

In addition, Mr. Randle advised detailed preparation for collective bargaining to determine answers to these questions: (1) What are the proper bargaining limits? (2) What limitations must be secured to protect the company's profit-making ability? (3) What counter-proposals can be made? (4) What demands can be made on the union? And (5) how can the issues best be handled in a constructive fashion?

Usually, Mr. Randle concluded, bargaining results are no better than the thoroughness of preparation. Thus, a decided premium rests upon being ready for the guaranteed annual wage discussion.

Fringe Benefits or "Benefits"

In view of the certainty that union demands this year will emphasize "additions" in lieu of wage increases, beware, be cautious, and be informed.

As W. A. Kissock, vice-president and manager of industrial relations, Hot Point Co. urged: "Avoid as you would the plague the type of concessions made for no other reasons than as a response to bargaining pressure with the thought that 'well, it won't cost much this year because not many of our employees are eligible now and maybe they will resign or die or go away before we have to face the facts.' The cost of a fringe benefit is just as real as the cost of a direct wage increase, even though some of your fringe costs may be deferred. The day of reckoning is inevitable.

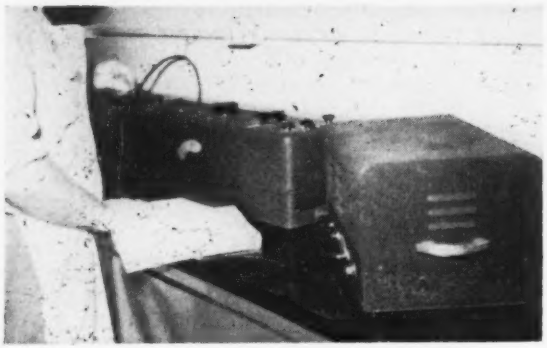
"In bargaining on fringes, management should estimate both the near-term and the long-term cost of the concession just as if it were a construction job or an engineering project. Since the cost of the same fringe benefit may be greater for one company than for another, costing should be based on your company's own circumstances and not on the experiences of others."

It'll Have to be Tight

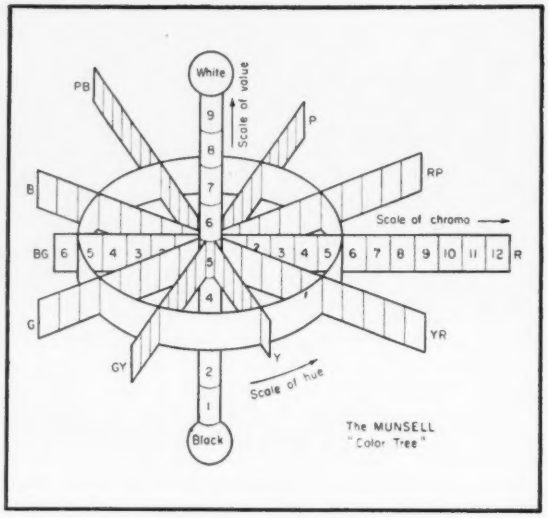
This year, according to Mr. Kissock, management will have to bargain tightly, for it has been a long time since we have seen anything like the shape of the coming battle for markets in an increasingly competitive economy.

(Turn to page 190)

Basic color data lead to . . .



TO ESTABLISH complete physical description of a food color, spectrophotometric curves are made of sample throughout visible spectrum. Curves then can be mathematically converted into ICI trichromatic color values that actually simulate mechanics of eye perception in derivation. These values then can be renoted into Munsell numbers and located on three-dimensional "color tree" (right).



COLOR CONTROL

Is Moving From Lab to Line

Optical instruments, supplanting the human eye, are bringing new meaning and precision to assays of color in foods. And today's streamlining of techniques points toward their ultimate control in process

LLOYD E. SLATER

Associate Editor, "Food Engineering"
(First eight photos taken through courtesy of QM Food & Container Institute's Chicago laboratories)

Since the first primitive gourmet, color has always been held an outstanding criterion of food quality. Yet only in the past decade or two have truly accurate, objective methods for its gauging appeared.

This is not to belittle those amazingly precise visual comparator systems which have helped the processor meet food color standards since the turn of the century. They are still highly valuable, and will continue so for many years.

However, subjective testing—no matter how refined—involves the human error, and modern food production has started making urgent demands well beyond this frailty.

Hence, filling this gap today is a growing array of optical instruments to supplant the human eye—spectrophotometers, electro-colorimeters, tri-stimulus meters, tubidimeters, ultra-photometers, etc.—which are contributing to an improved understanding of the nature of food color and its effect on quality.

True development of color instrumentation has been pretty much confined to a small group of experts in the field, and methods are still overly technical for the average processor.

► *But slowly there is looming a practical bent for this work. Involved techniques are being culled and simplified. And already there are hesitant signs of true in-process food color control.*

Because most food color reporting has been highly technical, and because work involved has been from many sources, with new instruments materializing almost over night, we will attempt a "round-up" in this report—to orient the practical food engineer to this important trend.

But before reviewing the many color measuring techniques that have cascaded into the food field in recent years, let us consider fundamentals: Just what is color? And why is its determination difficult?

Dr. B. A. Brice of USDA—a leading worker in the field—has this definition*: "Color is the general name for all sensations arising from activity of the retina when light strikes it."

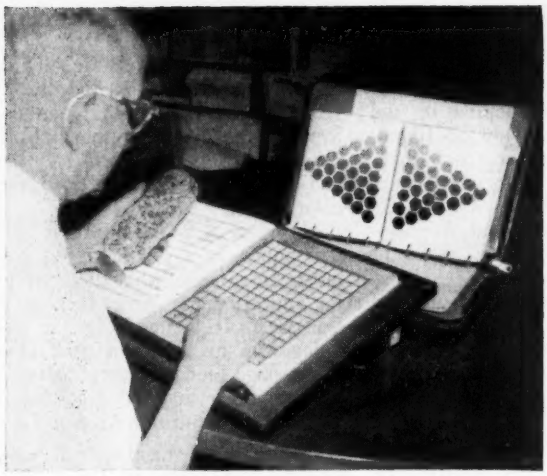
Naturally, this is a broad and basic definition. But it definitely establishes an important fact that must guide the person concerned with color in food—namely, that color is a sensation in the viewer and not in the object.

From Dr. Brice's definition then, when a person sees a color it depends upon three things: The light source; the sensitivity of the eye and associated registering equipment; and the physical-chemical makeup of the object. Variation in any one of these

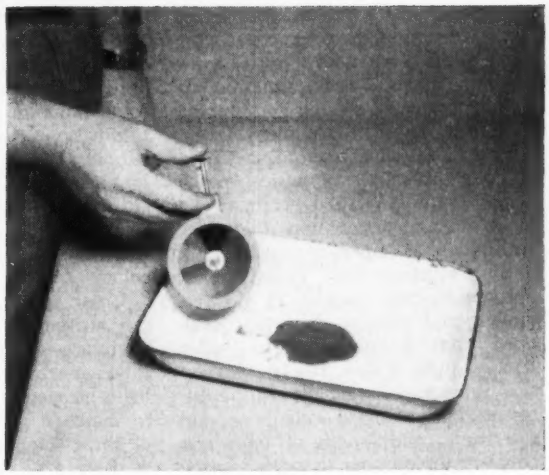
* Taken from a talk, "The Measurement and Specification of Color," delivered by Dr. Brice (Eastern Regional Research Laboratory, USDA) at the Symposium on Color in Foods conducted by National Research Council and QM Food & Container Institute in Chicago, Nov. 3, 1953.

F E SPECIAL REPORT

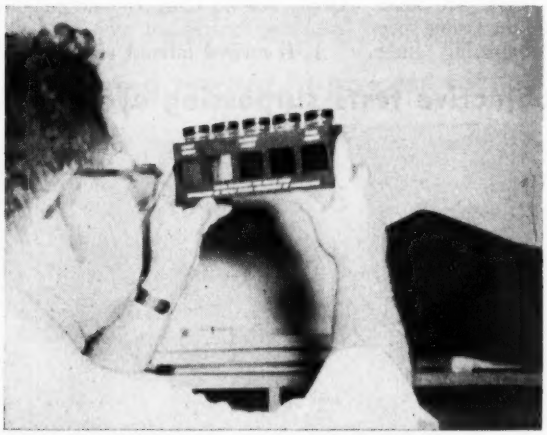
. . . better subjective color comparators



NUMERICAL designation of color permits its simple identification when comparing samples with standard color tables. Here, split peas are gaged with Merz & Paul matching book and Ostwald plastic-chip comparator.



SPINNING DISK colorimeter employs overlapping Munsell color cards that blend into solid color on whirling wheel to match tomato juice sample. Munsell values are read from cards and converted into ICI terms if necessary.



SIMPLE COMPARATOR, developed by USDA, for rapid, accurate determination of maple syrup color. It employs ICI values for three standardized samples in reference jars.

TINTED GLASS slides, also precisely developed by ICI value-assignment routine, provide visual check against molasses sample in this standard color inspection test.

. . . and finally bring us to (turn page) →

three basic factors will change the color perceived.

It is obvious from the above that any objective test for color will require a standardized light source and a standardized viewer. Also that the sample for test be ideally representative.

In the Mid-19th Century, Helmholtz developed the concept that color is three-dimensional—its perception being a sum-total of hue, intensity, and saturation.

Essentially, *hue* refers to that quality whereby we distinguish one color from another, such as red from green. *Intensity*, often called "value", is a color's lightness or darkness. And *saturation*, sometimes called "chroma", indicates the strength or weakness of a color.

Since the human eye is capable of distinguishing an estimated 7,000,000 combinations of hue, value, and chrome, it would appear an almost impossible task to classify color.

Many attempts were made toward its equation. Isaac Newton created a segmented circle composed of seven saturated hues with white at center, which could be used for predictable color mixing. Lambert enlarged on this by adding a third dimension to make the figure a pyramid with black located at its peak—this representing a projection of intensity.

Finally, a highly usable system for evaluating color was developed early in this century by H. P. Munsell, and it now is widely employed by the USDA relative to food color standards. This achieves a direct formula for color by assigning actual number to hue, value, and chroma.

To secure numerical values, Munsell divided the color spectrum into 5 principle hues—red, purple, blue, green, yellow—and 5 intermediate hues—red-purple, purple-blue, blue-green, green-yellow, yellow-red. These major hues are then subdivided into 10 secondary intermediate hues (*i.e.*, red-purple-red, etc.), and finally into 80 numerically graduated (from 1 to 10) special intermediate hues.

Thus, color in a ripening peach, for example, might be designated 3GH-G—indicating a slight development of yellow pigment in the fruit.

For value, Munsell uses a scale graduated from nearly black at 1 to almost white at 10. Thus a 3GY-G6 would mean that this green tinged

with yellow is slightly on the light side.

Chroma, in the Munsell System, also is represented as a numerical scale value. This starts with 1—which indicates a grayish, weak, almost completely absent color—and goes up the scale to the most intense pigment.

Hence, the final formula assigned as color of our hypothetical peach might be 3GY-G6/8—certainly a more precise designation than any such phrase as "ripening peach color".

By projecting these gradations of hue, value, and chroma in a three-dimensional pattern, Munsell developed what is known as his "color tree". Trunk of this "tree" is the vertical value scale, branches are the different hues arranged radially around the trunk, and length of branch is equal to the chroma strength of each hue.

It is obvious that any specific color can be pinpointed by locating its numerical value—determined perhaps by instrumentation—within the geographical area of this "color tree".

However, with growing use of this excellent system for numerically classifying colors, it was obvious that some equally precise and standardized method was needed to secure valid dimensional values.

In 1931 a fundamental system of color notation was adopted by the International Commission on Illumination (ICI). This approach takes into account the need for both standardized light source and viewer in developing values for hue and chroma—the so-called "chromaticity" aspect of color

Color values by the ICI method are arrived at by determining the fractional—X, Y, and Z—amounts of three imaginary red, green, and blue lights needed for a standard observer to match a given sample under one of three standard illuminants (called A, B, and C, the latter approaching average daylight and usually employed in colorimetry).

Briefly, to achieve these X, Y, and Z values, spectrophotometric transmission or reflectance curves are made of the sample through the visible spectrum. Then, by comparing these curves with an ICI chromaticity diagram and charts, numerical figures for hue, value, and chrome can be determined.

In combination, therefore, this use of spectrophotometric analysis, the ICI Standard Observer & Coordinate System, and Munsell nomenclature, provides a definitive path for study and specification of any exact food color.

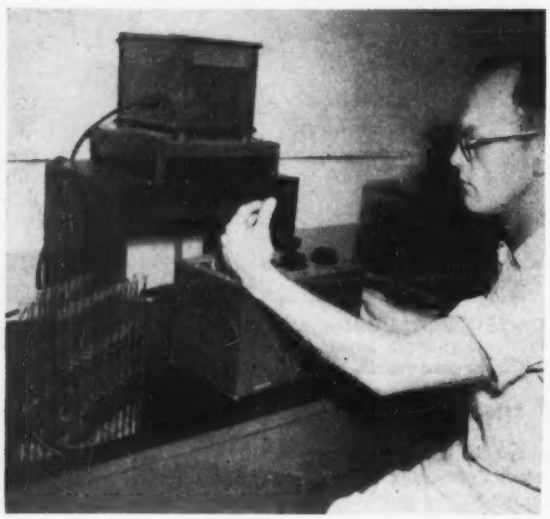
However, it is obvious that these techniques, as a sole route to color measurement, are rather time-consuming and elaborate. True, they are invaluable in basic studies by the technologist in his lab. But what about the average food processor? Must he set up similar involved procedure to further color control in his plant?

Spurred New Methods

Actually, the advent of this basic procedure for precise identification of food color gave impetus to two parallel efforts toward abridged and practical metering for in-plant use:

1. **It revived interest and increased**

→ **. . . objective tests surpassing eye-gaging**



ADOPTION of photocell measuring circuit to colorimetry has eliminated operator misjudgments in comparators as well as possible changes in results due to uncontrolled light conditions. Generally, photoelectric colorimeter compares transmission of light of various colors through sample and standard, with photocell bridge pick-up providing a ten-fold increase in accuracy over human eye. Evelyn unit seen here selects its light wavelength with an adjustable filter-band and employs normal glass cuvettes to retain both sample and standard. Any variation in light absorbed through two cuvettes shows up in galvanometer deflection in scalebox behind instrument—zero indicating an exact match. Reference solutions are simply made. With strawberry preserves, for example, congo red, standardized against water for a numerical rating, does job. This is one of most rapid instrument color tests but is not recommended where accuracy better than 2% is needed. It has found use in measuring degree of browning in potatoes as well as in gaging anthocyanin pigments in preserves.

GREATER PRECISION in evaluation of extracted food color is afforded by abridged spectrophotometric techniques that provide an absolute measure of transmission of monochromatic light through a sample. In this method, visible light is broken into its spectrum, and any desired wavelength is selected down to a few mm. This beam alternately is passed through sample and standard to a balanced bridge photocell pick-up. From indicated values, spectral curves also can be drawn for sample and directly converted to ICI values, with accuracy often exceeding 0.5%. Coleman unit (above) uses a diffraction grating to secure selected monochromatic light and employs modestly priced sample cuvettes. Affording accuracy down to 4-5 mm. in visual range, it is ideal for many routine determinations. Another, more costly type spectrophotometer achieves greater accuracy with quartz prism dispersion and precision ground cuvettes. It also includes a special reflectance attachment that permits similar color evaluation of solid foods such as sugars, tomato items, peanut butter.

precision of visual comparator-type color control methods.

2. It opened the door to optical instruments for faster, simpler assays—and eventual continuous measurement and control.

Consider the effect of comparators. Simplest of these devices permits a visual match of the food sample against a standard of desired color. Usually this standard consists of a clear colored solution or a tinted card or tile.

Aside from errors due to the human observer, the gravest shortcoming of the simple comparator is that its standard often deteriorates, losing its reference value. Further, prior to the ICI method, most standard colors were arrived at by "seeming" to fit the desired values.

Hence, by determining exact color values for the quality to be measured —whether for lima bean ripeness or a chocolate blend—a reference standard can be developed to offer a simple, yet fairly precise means for practical color control.

For example, USDA's application of basic ICI data to honey has led to development of amber glass comparators that have greatly improved accurate grading of this product. If the sample is viewed by a standard observer in standard white light, an exact matching with amber standards can be made under a fixed chromaticity set-up.

A somewhat similar comparator was developed for maple syrup grading, with equal improvement in accuracy and convenience.

Improvement in visual colorimetry has also resulted. Munsell color cards, overlapped in a spinning disk can be adjusted to match a food sample, with the overlap translated into ICI terms. Also, the Lovibond Tintometer employs light subtractive slide units of red, yellow, and blue with known ICI coordinates.

Recently, thorough test of an elaboration of the Lovibond system—involving the Lovibond-Schofield Tintometer—showed great promise on various foodstuffs in England.** Here, the unit has been modified with a movable-vane shading device, and two rather than three colors are utilized in matching. This permits simple, direct chart conversion to ICI units.

It should be mentioned that other refinements have improved accuracy of the Tintometer. Defocusing viewing lenses are used to obviate surface or texture variations in the sample. Also, a spinning sample cup will iron out any uneveness in color.

Era of Photocell

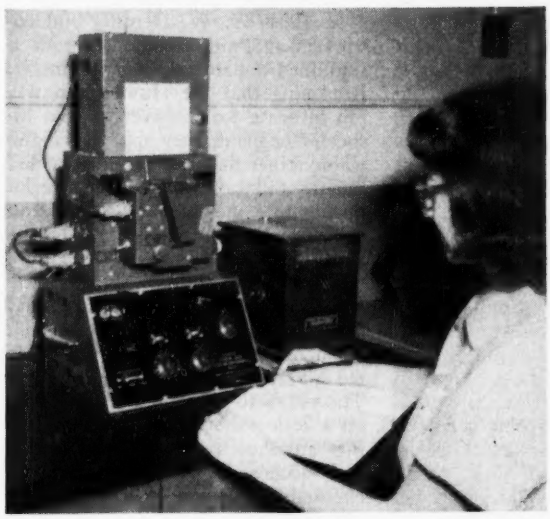
Food researchers in early ICI determinations were struck by the possibilities of basic spectrophotometric analysis. Granted, one was really not measuring color as the eye saw it. But by substituting a photocell and indicator as observer, human errors almost completely were eliminated.

As a matter of fact, it was estimated that the use of a photocell to replace human eyes increased accuracy tenfold over visual methods.

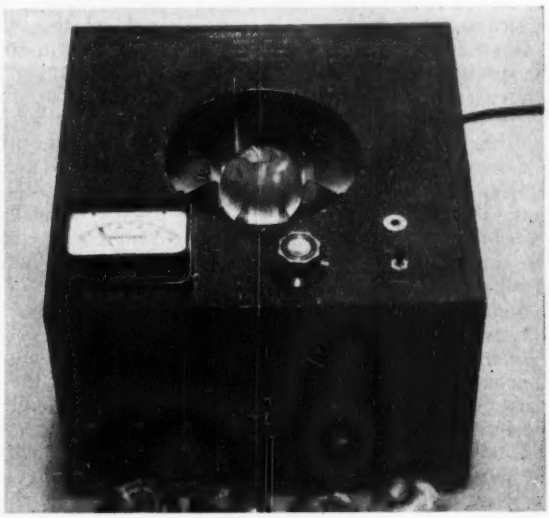
Shortly after the war, one of the pioneer food-color workers, Amihud

** British Food Mfg. Assn. Research Report No. 41, Nov. '52.

and aiming toward in-process setups



MORE DIRECT approach to what human eye actually perceives as color is offered in Hunter Color Meter. This photoelectric comparator employs three filters with spectral transmission characteristics that duplicate color reaction of ICI standard observer. Instrument first is standardized against a calibrated reference color tile, then food sample is placed inside exposure chamber (top). Three readings are taken by adjusting each of three calibrated scale dials to produce a zero position on galvanometer (right). One reading, the L scale, represents visual lightness and corresponds to 100 times square root of ICI-system Y value. The *a* and *b* scale readings represent color gradations and are converted to ICI coordinates by simple formulas. Practical use of Hunter scale readings as such has been made by relating these to U. S. Grade for color with a nomograph chart. Instrument has found wide use in color studies of tomato concentrate, dried milk, evaporated milk, canned sweet potatoes, dehydrated eggs and, lately, in determining color changes in fresh and table-ready meats.



SIMPLIFIED, inexpensive photoelectric color meter was developed at Purdue University to offer field men and average plant personnel an accurate grading device for both raw and processed fruits and vegetables. Specimen is placed in holder lit from below by a fluorescent lamp and surrounded by ring of evenly-spaced filter-photocell combinations. Its reading is thus proportionate to average surface color. As used in color-evaluation of tomatoes and apples, instrument employs alternate red and yellow filter-photocell units, so that reflected red light is in 630 millimicron range and yellow near 360. In effect, meter separates reflected yellow from reflected red light and indicates their ratio on a 0-to-100 direct-reading scale. Comparison of readings on flasks of tomato juice against Hunter values showed close agreement between two methods. Similar correlation was found between instrument readings on whole fruit and ratings by expert graders. Another unit using color-ratio approach is cut-fruit grader developed by Magnuson Engineers, San Jose, Calif.

Kramer of the University of Maryland, reported the drawing of color transmittance curves of pigments extracted from beans, beets, carrots, corn, peaches, and tomatoes. He found spectrophotometric assay needed less special training and was less cumbersome than previous subjective tests.

Relation of instrument-measured color to ripeness was also probed in '47 by Kramer and H. R. Smith of NCA's research laboratory. Here, spectrophotometric analysis of extracted pigments from peaches and apricots correlated a numerical value with ripeness judged by organoleptic methods. This suggested that instruments could perhaps be applied in exact color control of harvesting or material selection.

Recently, abridged spectrophotometric tests—measuring reflectance or transmittance at only one or two specific wavelengths—have been developed to evaluate color in such foods as sugar, flour, fats and oils, strawberry preserves, and capsicum spices. Usually these simplified methods relate to the intensity of one or two key factors that show up on these spectral curves, such as the carotinoids and chlorophyll-like pigments that are responsible for the red color of chili derived from capsicums.

However, inherent shortcomings in the spectrophotometric approach have spurred a search for simpler techniques whereby color assay might be moved from the research lab into the plant. For one thing, carefully extracted samples are needed for transmittance tests, and tedious conversion is required to reach ICI or Munsell values. Further, drawing spectral curves takes valuable time and is liable to error.

Admittedly, some of these difficulties have recently been overcome with the continuous recording spectrophotometer with built-in tri-stimulus integrator. But this still is a highly expensive instrument.

Even so, to many food workers, the paramount lack in spectral color analysis is that it does not directly approach color as the consumer sees it—instead offers data through curves that in themselves are open to individual interpretation.

Simulated "Eye"

What was needed, many believed, was a simple objective colorimetric technique that would simulate the color-perceptive response in the human observer—a unit giving a direct-scale measurement of color values without involved calculations.

A major step toward this objective had taken place in 1940 when Richard Hunter of the National Bureau of Standards announced development of filters which, in combination with photocells, would be spectrally equivalent to the ICI standard observer.

Shortly thereafter, Hunter developed this concept into a unit which he called a "multipurpose photoelectric reflectometer"—for providing data on the color, apparent reflectance, and specular gloss of materials. By 1948 this instrument had been simplified and commercialized into what is currently known as the Hunter Color Meter.

Briefly, the Hunter unit provides a galvanometer scale comparison between color reflectance of a sample and a reference tile with known ICI coordinates. To get total color perception, it employs three filters approximating the X, Y, and Z functions of the ICI system, and the electrical output from this tri-stimulus filter-photocell combination is put through a computer circuit to emerge as three scale readings for each color measured. Essentially, these numbers are values for total reflectance or "brightness", redness to greenness, and yellowness to blueness.

While readings on the Hunter "brightness" scale directly relate to the Y function of the ICI system, a mathematical conversion must be made of the other two readings to convert them to standard ICI color specifications.

Because of its direct approach to "3D" color and its unusual sensitivity to small color differences, the Hunter meter quickly attracted attention of food workers concerned with product color as an index of its quality and consumer acceptability.

In 1950, both Kramer and S. G. Younkin of Campbell Soup Co., separately evaluated the tri-stimulus meter in measuring color of tomato products—one of the most challenging grading problems in the food field. Younkin found it possible to set up a system for specifying tomato color based on differences not actually detectable by the human eye. And these assays could be accurately made at 30 per hour.

Later, several other workers confirmed the practical value of tri-stimulus colorimetry in more accurate grading of tomato products. For example, Buck and Sparks at H. J. Heinz Co. related raw tomato color to finished catsup in factory operations—suggesting a new approach to more realistic grading standards.

Need for Simplicity

While spectral analysis and, later, precise tri-stimulus metering offered basic approach to the three-dimensional aspect of color in foods many workers believed that these techniques were needlessly complex—working against the intent to bring in-plant color control into its own.

Color appeal of many foods, they argued, could be linked to two or often only one value—making complete color description in ICI coordinates superfluous.

For example, in 1948 Kertesz and Sondheimer of the N. Y. State Agricultural Experiment Station, related the undesirable brownish color developed during processing of strawberry preserves to loss of the red anthocyanin pigment. They then developed an inexpensive method of measuring this pigment with a single-dimension photoelectric colorimeter.

Then in 1949, Kahlenberg of National Egg Products Assn. developed a somewhat similar rapid color control for dried egg yolk color. Here, a simple photoelectric filter photelometer expresses for an acetone-extracted sample a number relating acutely to the coloring property of the dried egg batch in subsequent processing.

But while many isolated simplified color tests on diverse foods have appeared, the greatest effort toward simplified metering again seems to have centered around tomato products.

In 1951, N. W. Derosier and coworkers at Purdue came up with a simplified tomato color grading meter. Reasoning that the Hunter unit was too intricate for the average field inspector or plant, they approached the whole rather than the cut or extracted tomato and tied down its ripe color quality to a measurement of red and yellow factors in skin surface of the fruit.

Briefly, the Purdue Color Ratio Meter submits the fruit to a central fluorescent light, with reflected color taken off by a circle of ten alternate red and yellow filter-photocell units. The yellow-to-red ratio is read directly on a scale calibrated to grade. Readings are thus made almost instantly, and accuracies of the unit have checked very closely with Hunter determinations.

Recently, this same meter has also been applied to color-grade apples.

And in California a similar quick-test instrument—called the Agtron—has been officially adopted for grading tomatoes by that State's Department of Agriculture. This unit measures ratio of blue to red in cut halves of a tomato by means of dual filter-photocells.

While the above simplified, speedy instruments for measuring raw fruit represent a bold step toward eventual color control of such product in the process plant, their intrinsic value is still a controversial subject among food-color workers. So to throw light

on this question, let us consider how the framework for developing simplified measurement is set up.

Route to Simplicity

As Amihud Kramer succinctly put it, "Measurement of color in foods is not an end in itself, but a measure of quality characteristics of interest to the consumer."***

This, in a nutshell, should be the guiding philosophy for those practical food engineers who wish to set up color control in their process lines. True, color is indeed three-dimensional and a meter worth its salt should approximate response of the human eye. But very often the human response relates significantly to a color factor that can be approached more simply through one or two-dimensional measurement.

As Kramer suggests, then, the first step is to link the importance of the color in question with the consumer. This can be achieved by setting up a trained sensory panel that can rate the product by preference. Then the "appeal effect" of a certain color can be analyzed statistically.

Importance of the consumer approach to color cannot be overemphasized. Howard Schutz, QM Food & Container Institute psychologist, has described*** how people like or dislike colors in foods not for the colors themselves, but rather for the meaning these colors have in terms of their likes and dislikes relative to the satisfaction value of that food.

Hence, it follows that the consumer reacts negatively, for example, to the brown color in overprocessed condensed milk because he intuitively dislikes the associated flavor due to caramelization.

Once the quality-linked color is isolated statistically, its causative agent —be it a dominant single chemical or a complex—is explored instrumentally. This usually consists of drawing spectrophotometric curves of samples to isolate the effect in a region of the spectrum. Such work easily can be done by any consulting analytical laboratory.

At it often happens, it then may be possible to select a portion of the spectrum where—again due to intensity of chemical factors in the product —color difference between samples is large. This will permit utilization of an instrument as simple as a reflection-type photometer to measure the variable. Or at least it will allow a ratio-type approach, as exemplified by the Purdue meter.

Naturally, the actual steps to simplified color instrumentation usually involve many more complexities than the above oversimplified procedure suggests. Just the selection of proper samples often poses a detailed, intricate problem. Further, color-quality dominating factors may vary in the same product from region to region —as tomato researchers have found out.

Nevertheless, these possibilities opened by short-cut color instrumentation—even when developed for a specific product in one plant—are enormous. And so this work will assuredly go on, despite the protest of those who hold to thorough perfection.

In-Stream Control

In fact, the natural projection of bench-type 2-D and 1-D color measurement is obvious. By locating the sensing heads of modified filter-type photometric equipment above moving product, and under standard lighting, it may be possible to establish automatic color control on the line.

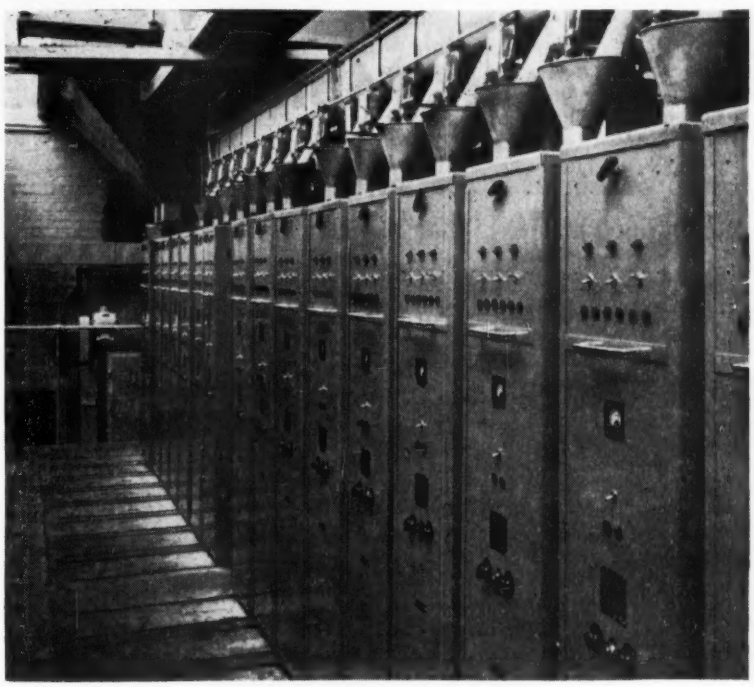
Actually, the rudimentary systems of this type have already been installed. One arrangement, consisting of a balanced photocell bridge—with one filter-photocell sighted on product, the other on reference standards—has been employed to actuate an electronic controller regulating oven speed in continuous cereal-flake toasting. Here, an optimum toast-color, as desired by the consumer, is held by color control.

Very recently, a similar packaged color-scanning system has been developed in England for automatic sorting of dried food products such as grains, nuts, peas, and beans. This unit ejects off-color product with 99% efficiency by passing a single stream through a triple photo-cell scanning area, with reference provided by a standard color card insert. It can readily handle 100 particles a second (see FE, Aug. '53, p 95).

Supplanting the simple, flexible "electric eye" approach in more involved food color control problems are many lately developed optical instruments with great potential for practical in-plant use.

For example, General Electric has come out with a pipe-line-type recording turbidimeter that continuously measures the amount of suspended particles in liquids with better than 5% accuracy. This unit suggests possible automatic control of the annoying "haze" color due to suspended particles in many liquid foods.

(*Turn to page 172*)



In-Stream Control Now

A PRESENTLY WORKING prototype of future continuous in-stream color-control, this battery photoelectrically sorts 7 tons of almonds per 8-hr shift. Nuts feed from overhead screw into funnels. Then, in each unit, they pass via vibrator into single file down tube and through photocell scanner, where color is compared to standard. Rejects leave by one chute, acceptable nuts by another. Scanning time for very small product, such as grains and seeds, can be as rapid as 1,000 per second. Unit also has sorted whole cranberries in water.

*** Statement at Symposium on Color in Foods, Chicago, Nov. 3, '53.

The informed group always does the job better. Labor costs can be cut 10 to 15% by—

Planning and Scheduling

Your Maintenance Work

Maximum benefits of preventive maintenance—in reduced machine downtime, higher product output and quality, savings in man-hours and materials—all are gained when work is done on a pre-determined basis

GEORGE J. MARTIN

Manager, Mechanical Division, Production Dept., National Biscuit Co., New York City

Sound procedures are called for in working out a program and putting it into action if you seek proper control of activities in your maintenance organization.

Only this way can maximum benefits of "preventive maintenance" be realized. Mistakes in scheduling work assignments and lack of proper follow-up will result in increased machine downtime, loss of production, and unnecessary time and expense on the part of the maintenance crews.

Present day management demands an efficient maintenance organization. Executive reports are required to establish budgets, work-load charts, equipment downtime reports, and comparative data on maintenance costs. Through a planning and scheduling department, top management can be assured of savings ranging from 10 to 15% of maintenance payroll costs via reduced labor.

Plants Compared

Many executives compare maintenance costs of plants having the same basic operations. Occasionally they fail to recognize that, in reality, the methods and procedures used by each maintenance organization determine the individual plant's relative position —whether it is outstanding or near the bottom of the list.

A company may have capable mechanics and ample supervision. But without the key links—good planning and scheduling—maintenance fails to achieve a low-cost, efficient basis.

With a large number of companies now using preventive maintenance, in part or as a complete program, there is now ample evidence of greater efficiencies and lower costs—as compared with those companies that persist in considering this phase of maintenance as only a minor function.

Since World War II many industries have increased their mechanization programs, and remarkable changes have been made in production lines to date. Maintenance forces had to be increased to keep the added equipment functioning properly. Today's executives have become aware of the importance of good maintenance. They closely compare daily costs of maintenance with production costs. And, through analysis, they are constantly striving to improve maintenance efficiency and reduce costs without lowering work quality.

Maintenance departments must function smoothly and efficiently at all times to keep every production unit in good condition for uninterrupted

Going Into the Details

MAINTENANCE scheduling should be broken down to the various types of jobs for which personnel is required. Here, the breakdown comprises the following five respective groups:

1. **Routine work**
2. **Preventive inspections**
3. **Routine assigned work**
4. **Periodic equipment overhaul**
5. **Emergency repair work**

Group 1 (Routine work)—These activities, such as lubrication, cleaning, lamp replacement, can be readily scheduled. Standing work orders are used for all these operations. And standard procedures have been established to cover all. Area mechanics assist crews assigned to work in their department.

Group 2 (Preventive inspections)—Area mechanics, and occasionally craftsmen from the central shops, make inspections on an assigned, scheduled basis. Standing work orders are used for charging time expended.

Group 3 (Routine assigned work)—All tasks in this category are covered by work-order requests. Work is all planned, scheduled, and carried out on an assigned priority basis. Schedules are prepared a day in advance. Week-end work is planned and scheduled at least two days in advance.

Group 4 (Periodic equipment overhaul)—Here, schedules are determined from preventive inspection reports, and they are planned six months to a year in advance to tie in with production schedules and sales planning. Motors, pumps, compressors are occasionally contracted for overhauling when available manpower is low.

Group 5 (Emergency repair work)—Although this type of work cannot be planned, every attempt should be made to give it priority over all other endeavors. When a breakdown occurs, craftsmen should be assigned immediately without normal planning. However, requisitions are to be prepared as quickly as possible and the regular schedule adjusted on other work in process. Craftsmen assigned to specific duties may be made available for emergencies or breakdowns.

Preventive maintenance works to reduce breakdowns to a minimum.—*G.J.M.*

operation. Quality products and efficiency in operations are synonymous.

Anything that reduces maintenance efficiency, invariably increases depreciation and production costs. Plant production methods cannot be termed modern if the equipment is serviced by out-of-date methods. A well organized and efficiently operated maintenance department pays big dividends in any industry.

The engineer supervising maintenance should divorce himself completely from routine procedures. He should delegate such details to others, who accordingly will become specialists in particular maintenance functions, such as planning and scheduling. He then can channel all of the work orders through them. In many large plants this phase has been handled by the plant engineer, master mechanic, or craft foreman. In others it is being done by a combination of several supervisors.

Where to Concentrate

As no two men think alike, such planning and scheduling usually hits snags, creating confusion and lowering efficiency.

Supervisors can do a much better job in maintenance by confining their ability and attention to the crews.

The number and type of personnel required for the planning and scheduling depend on size of plant, area of operations, amount of daily work load, and number of craftsmen available. Another factor is complexity of the mechanized operations. In any case, the number of persons assigned should be sufficient to handle all operations around the clock.

In a very small plant, where the installation of such a department is not feasible, this operation can be handled by the maintenance superintendent or master mechanic as a part of each job supervised.

In the medium-sized plants, having 60 to 90 craftsmen (maintenance employees), the function of planning and scheduling can be shared by the craft foremen with the maintenance superintendent. Here, a maintenance clerk usually covers some of the planning and scheduling by screening all work orders, passing urgent ones to the mechanical superintendent for approval and assignment, and retaining the non-urgents for scheduling and for a backlog. This clerk also frequently acts as a dispatcher, taking phone calls for maintenance services. And he compiles records of maintenance jobs, including costs, also schedules materials through the storeroom for planned jobs. The maintenance superintendent determines the priority of jobs, also works directly or through the foremen. Routine maintenance is scheduled directly by the foremen.

Planning and control boards frequently are used in the small and medium-sized plants. But they are recommended only if they save time. Where craftsmen are assigned routine work, giving them a "run-down" on their tasks for a full day will save time and money. Thus, they can go directly from one job to another.

In the larger plant, having 100 or more craftsmen, planning and scheduling are much more complex. Although the craft supervisors can share the burden, development of specific personnel to handle functions increases efficiency and reduces cost. Thoroughness in planning largely determines the cost of maintenance jobs.

Here are good reasons why all maintenance work should be planned and scheduled: Work thus is done with least amount of interference with production and with less machine downtime. The greatest economy of use of available maintenance man-hours is feasible. Since work orders are estimated, it is relatively simple to distribute available manpower to the jobs in priority sequence.

When work of craftsmen is planned at least a day ahead, they are able to work with a minimum amount of delay between jobs.

The planning and scheduling properly can be done by one person for every 100 craftsmen (this varying sometimes due to number of work orders being handled).

Personnel assigned receive all of work orders, determine priorities, prepare job estimates, plan the work directly or with the assistance of craft foremen, line up all necessary material for the job, schedule the work, follow up job progress, collect the time, and prepare reports and records.

Trained Men Scarce

Personnel having complete practical job knowledge covering all phases of mechanical and electrical equipment, as well as building construction, are extremely difficult to obtain. On several occasions we have selected junior engineers previously used in minor phases of maintenance supervision. Their knowledge of the plant, maintenance procedures, craft duties, and responsibilities, have enabled them to develop quite rapidly. Then, too, there are craft foremen and maintenance supervisors to guide them at the start.

Good planning begins with the

work order. It should have a proper and complete description of the work to permit estimating job time in man-hours. In plants where the production department supervisory personnel make out the orders it is very desirable that they indicate properly the task to be done. We have found the use of maintenance manuals and standards very helpful. They are available to production as well as maintenance personnel. We also use a mineographed instruction sheet to guide non-maintenance personnel in making out work orders properly and indicating the priority desired.

Planning has been greatly aided through use of work orders. They permit the engineer and the planning and scheduling department to review the urgency of all maintenance work, scheduling the important jobs for immediate attention and creating a planned backlog for the maintenance crews. In this manner all maintenance overtime can be kept to a minimum, and weekend operations can be avoided as much as possible.

Qualifications of crews and their make up are important phases. The factors are area of the plant, operations to be covered, number of production units, and scheduled shifts of operations.

Weekly Conferences

In many of our plants, the maintenance department has found it extremely valuable to have a conference on Thursday afternoon of each week to review and plan the program for the weekend and the following week. Conferences of this type are very beneficial, especially in plants having three-shift operations. These meetings are also attended by production department supervisors (a different one attending each week). In this manner, these supervisors get opportunities to ask questions pertaining to work orders for their own departments. This has promoted cooperation between the two departments.

Equipment records are a primary requirement in setting up a preventive maintenance program. Complete historical data on all of the equipment requiring maintenance are a necessity. These records, in addition to recording nameplate data, have space for posting the record of all work done on the unit. Periodic examination of the equipment records will indicate whether the unit is economical to operate or needs replacement with a more suitable unit.

An important phase of the program is the periodic inspection of all of equipment on which production depends. Frequency of these inspections can be staggered to balance the work load uniformly over the entire year. These checks may be scheduled on a chart or handled by a tickler system using printed inspection forms for specific types of equipment.

Mechanical downtime reports are usually recorded in log books or reported on a printed form by the mechanics. A record of all such downtime is important to determine whether the maintenance department is making progress using preventive maintenance procedures or is in need of better maintenance to cover weak spots.

Breakdowns may occur even when using a sound program. However, after emergency repairs have been made, the equipment should be permanently repaired under planned and scheduled conditions to prevent a recurrence. In breakdowns, it is not only the cost of repairs that is to be considered but also the loss due to the machine operators standing idle. Breakdowns to machines that are an integral part of a straight-line production are serious and expensive.

Many engineers have stated that all maintenance work can be scheduled. Others feel that only a small percentage can be planned. The latter is true only in plants that have not installed modern preventive maintenance procedures. With planning and scheduling, engineers, have found that 80 to 90 percent of all maintenance work can be conducted properly. Data for effective planning can be accumulated from equipment records, periodic inspection reports, departmental records, time studies, and job analyses. All this contributes greatly in getting maximum benefits.

All maintenance, whether the jobs be large or small, urgent or otherwise should be scheduled. A heavy backlog of maintenance tasks is an indication of inefficiency.

We assign our excess available maintenance manpower to work in our shops overhauling equipment. This gives us a two-fold benefit—reduces peaks and valleys in maintenance scheduling and gives us an available crew for emergencies. The production department does not recognize the failure of machinery as an excuse for delay in production. Therefore, we must be prepared for any emergency.

Maintenance costs are probably the most elusive of all manufacturing accounts. There is a tendency to regard the maintenance department as a kind of standing army. Difficulty with this conception lies in determination of the size of the army. It is possible to schedule maintenance jobs just as production jobs are scheduled. Likewise, maintenance work can be set up to provide an approximation of expenditures from month to month.

In most plants, work measurement has been the function of the industrial engineering department. However, since the planning and scheduling department are fully familiar with the job requirements, the crafts required, and the efficiency of the maintenance crews, it is the author's opinion that this department should work jointly with industrial engineering on time studies, methods-time-measurement data, and estimating.

Since incentives in maintenance may have a bearing on incentives used in other departments of a company, we feel that this phase should be analyzed by the industrial engineering department and reviewed by the plant engineer before being recommended to management.

With labor and material costs at an all-time high, management is vitally interested in reducing maintenance costs as well as those of production. Both have a strong bearing on the manufactured product cost. Every effort should be made to increase your maintenance efficiency and reduce your costs through sound planning and scheduling.

Tips On P.M. "How-To"

FIRST, define functions—planning and scheduling—so that their vital values can be recognized.

Planning is a systematic, organized method for analyzing and laying out procedures and work to utilize men and materials to greatest advantage.

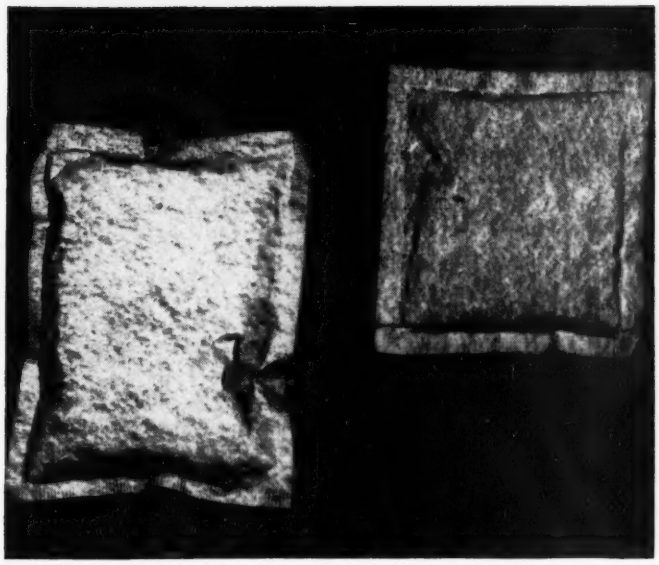
Scheduling is determining when each phase of the planned job may be done—to fit in with production schedules, receipt of materials, and available manpower.

SECOND, outline functions and responsibilities of all the various workers. And select them with the aim of assuring proper handling of the different functions necessary in maintaining equipment and buildings.

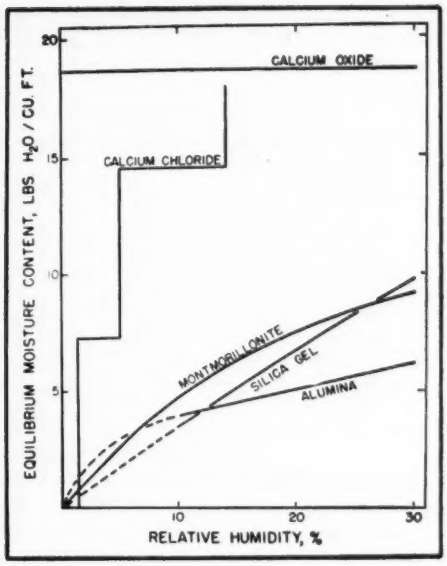
Note that type of company operations and size of plant have a bearing on the set-up of the mechanical staff required.

And there even is likely to be some variation in plants in similar fields.

But the general objective in all plants is: "Get the most work done in the shortest time possible with existing manpower."—*G.J.M.*



NEW LOW-COST desiccant container is suitable for high-speed machines. It is a promising development.



EQUILIBRIUM moisture contents of five desiccants as function of RH (see footnote below *).

Desiccating *In the Package*

★ What Desiccant to Use ★ How to Package It ★ Volume It Occupies in Package ★ Precautions in Using Calcined Lime

WILLIAM F. TALBURT, CARL E. HENDEL and R. R. LEGAULT

First two authors associated with Western Utilization Research Branch (Albany, Calif.), Bureau of Agricultural Research Service, USDA. Third author, formerly with the Branch, is now with Washington State College, Pullman.

There's been widespread interest lately in IPD (in-package desiccation). And the credit goes to recent developments in stable fruit powders[1] employing in-package desiccation to attain extremely low moisture necessary for storage stability. Also a factor is the renewed interest in vegetable dehydration.

Using IPD, a product is sealed in a hermetic container along with a desiccant—so that moisture can be transferred during storage from product to the desiccant. A water-vapor-permeable package for the desiccant prevents it from contaminating the product.

Moisture content of orange powder, for example, is reduced from 3-4 to 0.5% when packed with an in-package desiccant and stored. At this low moisture level, the powder has been shown acceptable after 6 months of storage wherein temperature has been held at 100 deg. F.

With orange and perhaps other fruit powders, it seems that IPD is indispensable if adequately low moisture levels (below 1%) are to be commercially obtained. This is borne out by data on drying rates of orange powder.[2]

These data demonstrated that it took 5 hr. to dry the powder to 3% moisture and 50 hr. to 1% when using a temperature of 113 F. and pressures of 300-600 microns. Other work[3] indicated that 1% moisture is not low enough to insure storage stability of dehydrated orange powder at a temperature of 100 F.

During the last war, IPD was intensively studied at the Western Utilization Research Branch with the aim of extending storage life of dehydrated vegetables.[4,5,6] Several small-scale commercial packs of dehydrated vegetables, with in-package desiccants, were put up in cooperation with the Quartermaster Corps. Results were gratifying, and a specification for dehydrated vegetables with IPD was issued by QMC in 1945.[7]

In 1950, a patent was issued on the application of in-package desiccation to citrus products[8].

In most work on IPD at this laboratory, needed moisture reduction was sought with minimum sacrifice of container volume to dessicant. In view of this, calcined lime has been used in most cases.

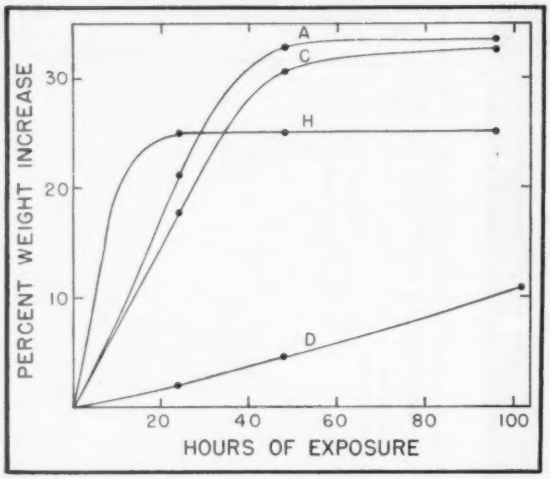
Choice of Desiccant

Available laboratory and industrial desiccants include calcined lime, calcium chloride, silica gel, alumina, and montmorillonite.

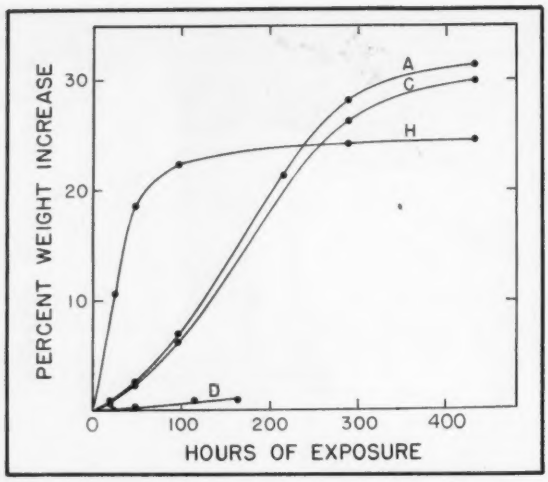
To meet requirements of foods, a desiccant must have high water-vapor capacity per unit weight and volume at the relative humidity to be maintained within the package. In addition, it must have a fairly high rate of hydration at the desired humidities, and must be a non-toxic, odorless, low-in-cost, and non-deliquescent solid.

Perhaps most important is high

* Curves are based on 58 lb. per cu. ft. for CaO, 45 lb./cu. ft. for $CaCl_2$, 60 lb./cu. ft. for montmorillonite, 50 lb./cu. ft. for silica gel, and 45 lb./cu. ft. for active alumina. Sources for equilibrium moisture data: Montmorillonite—Lovett, R. A., "New Uses for Desiccants," *Modern Packaging*, Jan. 1949.; Silica gel—Product Data Sheet *Protek-Sorb 121*, Davison Chemical Corp.,; Alumina—Anon., *Filtrol Alumina Product Bulletin No. 1*, Filtrol Corp.; CaO—International Critical Tables, 7, 294, McGraw-Hill Book Co., N. Y., 1930; $CaCl_2$—Ibid, 7, 294.



COMPARISON of hydration of four 2g. lime samples (A, C, H, D) over saturated sodium bromide solution (75F.)



ANOTHER comparison of the four samples, this time over saturated lithium chloride solution (75F.).

water-vapor capacity at the desired humidity. Silica gel, alumina, and montmorillonite have been employed as in-package desiccants for candy and potato chips, which do not require extremely low humidities. And montmorillonite has been used satisfactorily for experimental packaging of dehydrated cabbage, onion flakes, and onion powder.[9, 10]

However, in using IPD for such products as orange powder, it has been necessary to reduce moisture content below 1% to obtain storage stability at 100 F. Such a product requires a desiccant with a high hydration capacity at below 5% relative humidity.

Water-vapor capacities of some of the common desiccants (in terms of lb. of water absorbed per cu. ft.) are shown here in our first graph. Apparent are perhaps adequate absorptive capacities of silica gel, alumina, and montmorillonite, where humidity within the package does not have to be below 20 or 25%. However, at a 5% humidity, these desiccants absorb only about 5% of their weight of water.

Under the some conditions, calcined lime absorbs about 32% of its weight of water. It thus has excellent water-vapor capacity, and it will essentially maintain 0% humidity until completely converted into calcium hydroxide.

Calcium chloride is a reasonably good desiccant at low humidities, although it does not have as high water-vapor capacity as calcined lime at humidities of 10% or less.

Bulk density or weight of a unit volume is also a factor in selecting a satisfactory desiccant. High bulk density, in combination with a high water-vapor capacity, is desirable to minimize container volume that must be sacrificed to the in-package desiccant.

Some factors to be considered in selecting the proper desiccant for IPD are tabulated in Table 1. Both densities and moisture-absorption characteristics of commercial desiccants vary considerably. Also, different lots of lime vary widely in their capacities and rates of hydration. Because of these variations, some grades and types of lime are not acceptable.

Our second and third graphs show differences in rates of water sorption of four commercial samples of lime over saturated lithium chloride (11% RH) and sodium bromide (55% RH) solutions. Moreover, Table II shows calcium oxide content and ultimate water-vapor capacity of several samples of lime selected because of differences in calcium oxide content.

Obviously, high-purity lime is desirable because of higher ultimate capacity. In addition, impurities such as silicates are undesirable, since they sinter during burning of limestone and may result in a dense unreactive lime.

Some Precautions

Other factors such as burning temperature and perhaps crystalline structure also may affect activity of calcined lime. Interrelationships of these factors are so complicated that it has not been possible to describe a satisfactory lime in terms of chemical composition and/or manufacturing procedure. However, a satisfactory test has been worked out for lime in terms of capacity and rate of hydration.

Calcined lime increases in volume during hydration—the amount of expansion varying greatly between samples and ranging from about 60-170% of original volume. If too closely confined, the force of expansion is sufficient to rupture all containers thus far tested. Provision must be made to allow for this expansion during hydration of lime. This is true in both rigid and non-rigid desiccant containers.

Prevention of packing of lime is also important if desiccant-container failure is to be avoided. Lime does not readily "flow" upon hydration, especially when subjected to mild pressures. Instead, it tends to pack tightly at points of constriction. The impacted lime then acts as a barrier to further expansion and the container may rupture even though only partially filled.

To avoid this difficulty, the depth and diameter of rigid containers should be about equal. Where non-rigid containers are used, care should be taken that empty portions are not "pinched off" from other parts of the container.

The large amount of heat liberated as lime hydrates (16 kilocalaries per mole) may necessitate a third precaution—to prevent overheating within large stacks of the packaged product while desiccation is in progress. This has never been observed but, nevertheless, is a distinct possibility. Since desiccation is accomplished over a period of weeks or months, it is probable that liberated heat will dissipate without any appreciable temperature rise. If significant heating should occur, a stacking pattern may be necessary for packed cartons to permit air flow.

Volume Occupied

Amount of moisture removed from a product by IPD is limited by container space to be sacrificed. The high sorptive capacity of calcined lime

Data Reveal Properties of Desiccants and Packages

TABLE I—PROPERTIES of Potential Desiccants for In-Package Desiccation

Desiccant	Bulk Density (lb./cu. ft.)	Ultimate Water Vapor Capacity (%) 1% RH	5% RH	20% RH	30% RH	Odor	Toxicity
Alumina [1]	45	1–2	6	11	14	None	Non-toxic
Calcium Sulfate (anhydrous)	..	1	4	6	6	None	Non-toxic
Calcium Chloride [2]	..	1	16	64	96	None	.....
Calcium Oxide							
Before hydration ca	60 [3]	32	32	32	32	None	Non-toxic [5]
After hydration ca	30 [4]						
Montmorillonite [1]	60	1–2	5	12.5	16	None	Non-toxic
Silica Gel [1]	50	1–2	4	13	20	None	Non-toxic

[1] Manufacturers' data (see graph on first page and its footnote).
[2] Deliquescent at humidities above 31%.
[3] Range observed at this laboratory for various lime samples: 46 to 65 lb./cu. ft.
[4] Range observed at lab for various hydrated lime samples: 22 to 41 lb./cu. ft. Recalcined hydrated lime samples tend to give hydrates with higher bulk densities than lime samples produced by direct calcination of limestone.
[5] Calcium oxide is corrosive and highly reactive. If CaO were introduced accidentally, reconstitution of the dry product would immediately convert the oxide to the non-toxic hydroxide.

TABLE II—CALCIUM OXIDE CONTENT and Ultimate Capacity of Samples of Lime Held at a Temperature of 75 Deg. F.

Sample	% CaO Calc.	Ultimate Capacity % CaO Calc.	% Over LiCl Sol.[1]	% Over NaBr Sol.[2]
Theoretical	100.0	32.1	....	....
A	98.8	31.8	31 [3]	33.5
C	97.6	31.4	30 [3]	32.5
D	58.3	18.7	1 [3]	19
H	86.2	27.7	24.5	25

[1] Vapor Pressure of lithium chloride: ca 2.4 mm. Hg, or 11% relative humidity.
[2] Vapor pressure of sodium bromide: ca 12.4 mm. Hg, or 55% relative humidity.
[3] Hydration still proceeding very slowly when test was terminated after 425 hr.

TABLE III—RATE of In-Package Desiccation of Dehydrated White Potato[1] in 5-Gal. Cans. Initial Moisture Content, 7.5% M.F.B.[2]

Desiccant Container	Storage Temp. (Deg. C.)	Days to Reduce Moisture Content to 5.0%
Canvas bag [3]	24	144
	38	50
	49	18
Laminated chipboard cylinders [3]	24	146
	49	20
End-perforated No. 2 cans [4]	24	365
	38	116
	49	58

[1] Piece size before dehydration: 3/8 x 3/8 x 3/16 in.
[2] Moisture-free basis.
[3] Total area Effective in transmitting water vapor—approx. 600 sq. cm.
[4] Total area effective in transmitting water vapor—approx. 5 sq. cm.

makes it possible to reduce the moisture content of dehydrated foods by several percent, if desired, without a prohibitive sacrifice in container volume.

However, it should be borne in mind that approximately 3 lb. of lime must be added to the package for every pound of water to be removed from product. For sake of economy, maximum permissible moisture in the product should be determined. And a desiccant should be used to obtain this moisture content rather than attempt to obtain unnecessarily low moisture levels.

From data in Table I and a general idea of moisture-vapor pressure relationship of product, it is possible to estimate fairly accurately volume of desiccant needed to absorb a given amount of water. If calcined lime is packed in a rigid desiccant ontainer, enough headspace must be allowed for expansion of lime, which substantially increases in volume during hydration.

Desiccant Container

The percent increase varies with different samples of lime. With use of a non-rigid desiccant container, previous experiments showed compacting and settling of product adequate to provide space for expanded desiccant. When using lime, a non-rigid desiccant container substantially reduces container volume to be sacrificed as compared to a rigid container.

To be satisfactory, container must be siftproof, accommodate expanding desiccant, provide reasonably low resistance to transmission of water vapor, and resist abrasion and puncturing.

Various containers were tested at this laboratory in cooperation with QMC. Dehydrated white potato dice were plant-packed in 5-gal. cans along with calcined lime, which was put up in various kinds of desiccant containers. Included in the test were heavy canvas bags, rigid laminated chipboard cylinders with metal ends, and combinations of jean cloth and medium weight kraft paper bags. Some data are shown in Table III.

All containers were sufficiently resistant to abrasion and puncturing, with the exception of the paper bags when used alone. All were siftproof, except jean cloth bags when used alone. Rupture occurred in containers that were too small.

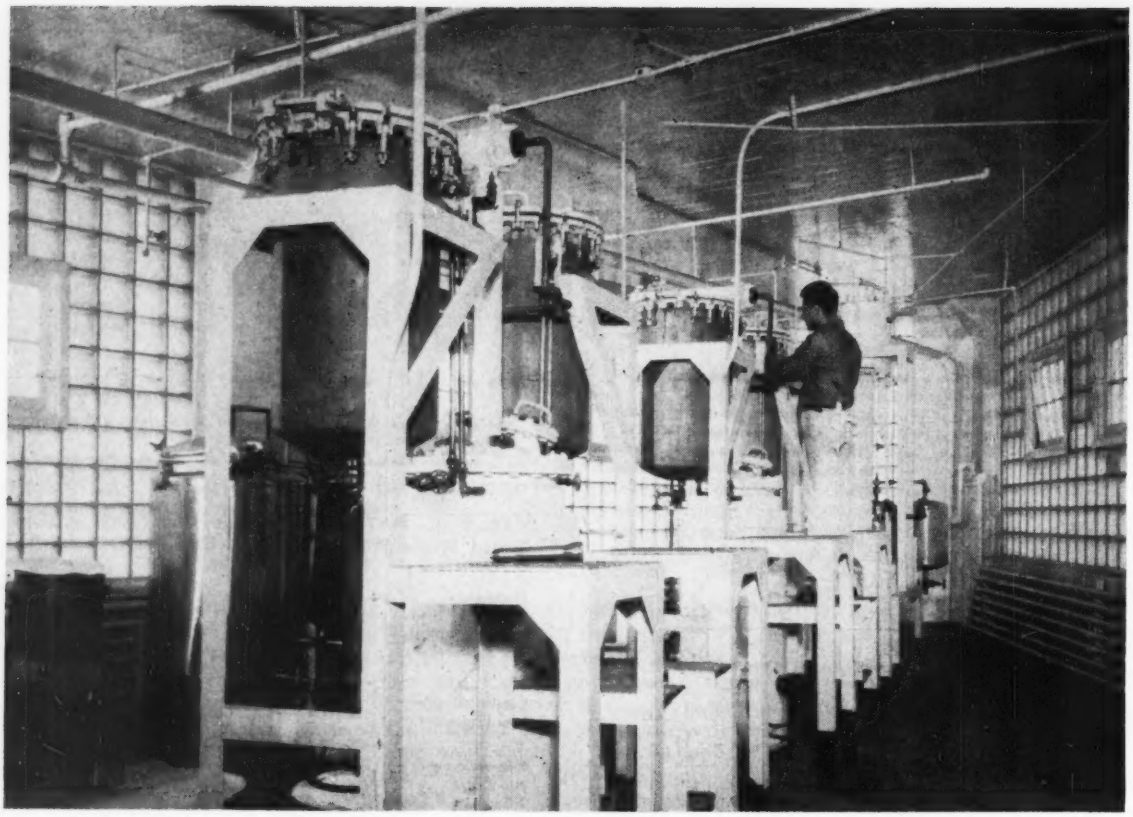
On the basis of these tests and rate estimations calculated from transfer coefficients, it was concluded that chipboard containers, canvas bags, and jean cloth bags with paper liners are satisfactory desiccant containers in all respects. This is true provided they are large enough to contain expanded lime, and care is taken not to "pinch off" empty portions of non-rigid containers from other portions.

Recently, a promising new lower cost desiccant container has been developed. It comprises a new type of double-creped kraft paper for forming the envelope. Coated with a heat-sealing material on one side, it is suitable for high-speed machines (see photo). Thus, IPD packets can be cheaply fabricated in a variety of sizes.

This type IPD unit was successfully used by the Vacu-Dry Co. in packaging a trial-procurement order** of orange juice powder for the Quarter-

(Turn to page 194)

** Desiccant envelope was enclosed in a jean cloth bag as a precaution against rupture. This precaution could be used in other instances, where experience with the desiccant and desiccant container is limited.



OLEO RESINS are obtained by solvent extraction, then solvent is removed in this vacuum equipment.

Getting Down to Principles on the

What and Why of Drink Flavors

True fruit flavors give best results. But some can't be concentrated sufficiently, and so require other stronger natural flavors or synthetics

EUGENE A. MORGAN
President, Blue Seal Extract Co., Cambridge, Mass.

Flavor is not a single, sharply defined sensation but the combined effect of many basic sensations such as sweet, sour, bitter, and burnt.

There are other sensations which also contribute to overall flavor. Examples are temperature, body, texture, and color.

All of us are familiar with the effect of temperature, but we are not too well acquainted with the others.

Body is the effect of total amount of mass present and is generally associated with weight and viscosity. In soft drinks, body sensation is proportional to amount of sugar present. It could, however, be obtained from gelatin, vegetable gums, corn solids or milk-solids-not-fat.

Texture, on the other hand, is the effect of distribution of mass—whether the product is smooth, fine, homogeneous, or heterogeneous.

Color has a purely mental effect, but many soft drinks derive a major flavor sensation from their color alone. For example, several prominent orange drinks have lemon as a predominating flavor. But because they are colored orange the consumer associates their flavor with orange.

When we use only natural materials in producing a flavoring product we say that it is a natural or true fruit product. If all the flavoring ingredients come from the natural counterpart of the single flavor we are copying, then it is actually a natural flavor. Sometimes we add other natural flavors to build up the strength or character, and this produces a so-called "true fruit flavor with other natural flavors."

Examples are found in most true fruit flavors. Orange flavor bases usually contain some lemon oil or lemon juice. And many flavor bases have vanilla added.

The natural raw materials used in preparing flavor bases take many forms; essential oils, juices, oleo resins, solid extracts, and other materials.

Essential oils are the volatile oils from plants. They are obtained in three basic ways, of which steam distillation is the most important.

In this method, steam is forced

through the herb mass and the oil it contains is turned to vapor or volatilized. Steam and oil are then condensed and the latter is separated from the water by simply pouring it off.

Essential oils are also obtained by pressing the fruit and separating the oil from the juice or pulp. Extraction, with suitable solvents, is the third method. Here, the oil is dissolved from the herb and later is recovered by distillation.

Practically all essential oils consist of mixtures of hydrocarbons (terpenes and sesquiterpenes), oxygenated compounds, and small amounts of nonvolatile solids. The oxygenated compounds are the principal flavor bodies. They are relatively stable and soluble in alcoholic solution. The terpenes are relatively unstable and insoluble. They contribute very little flavor. However, they are easily oxidized by light and air and cause spoilage. For these reasons many essential oils have terpenes removed by fractional distillation or by washing.

Removing terpenes greatly concentrates the flavor and makes it more soluble—advantageous properties in making flavor bases. Terpeneless oils would be used more frequently except for their greater cost and for the desire to utilize the small amount of flavor in the terpenes.

Juices

Fruit and berry juices are widely used in flavor bases. Most of these are concentrated by removing the water under vacuum so that the final juice is 4, 5, or 6 times its original strength.

Flavor value of the juice depends not only on degree of concentration but on type of fruit used and method of concentration. Juices are usually preserved by pasteurization and/or addition of small amounts of benzoate of soda. For best results they are stored under refrigeration.

Oleo Resins

Through solvent extraction of herbs, oleo resins are obtained. In this process practically all of the flavor-bearing bodies are dissolved. When extraction is complete, the flavor-laden solvent is placed in a distilling apparatus, where the solvent is removed. The oily residue is the oleo resin.

These resins contain much more of the characteristic flavor of an herb than do essential oils. Most of the characteristic flavor of ginger is present in the essential oil, but none of the pungency. In order to acquire the full ginger flavor, the oleo resin must be used.

Most popular oleo resins are ginger, black pepper, capsicum, paprika, celery, and vanilla.

Commercial Forms of Flavor

For a flavor to be acceptable for use in commercial products, it must be water soluble or dispersible. The processes by which this form is attained result in many different finished flavors. Examples are extracts, emulsions, concentrates, powders, and combinations of each.

Most extracts are bases produced by dissolving flavor-bearing bodies in a solvent other than water. By federal standards, a flavor can be labeled "extract" only when the solvent used is ethyl alcohol. Bases using other solvents must be labeled simply "flavors."

An extract may or may not be an actual extraction from an herb. Vanilla extract is made by actually dissolving the flavor from vanilla beans with a mixture of alcohol and water. On the other hand, an orange extract is made by dissolving orange oil in alcohol. Some extracts can be made by either method, and it is such factors as cost, type of flavor desired, convenience, etc., that determine the method used.

Flavor-bearing bodies, although oily in nature, contain some constituents that are slightly soluble in water. Most of the remaining ones are soluble in ethyl alcohol. And ethyl alcohol is infinitely soluble in water. Therefore, solubilizing is accomplished in two steps:

1. By dissolving flavor-bearing bodies in alcohol and then dissolving the alcohol in water.

2. By creating such a dispersed condition of the relatively insignificant insoluble bodies that the final effect is the same as if they were in total solution.

When (Step 1) water is added to the alcohol solution, the less soluble substances precipitate and must be filtered out. Fortunately, this precipitate contains very little flavor. Therefore, we still retain most of our flavor after removing a great deal of the original material.

The precipitate is oily and will penetrate through filter papers or

HANDY GUIDE FOR CHOOSING BEVERAGE FLAVORS

Flavor	Best Type	Best Form	Recommended Strength	Remarks
Birch beer	Natural	Extract or emulsion	1 oz.	Because of faint color desired in finished drink, an extract is somewhat better than an emulsion.
Cherry	Natural	Extract concentrate	4 oz.	The 4-oz. strength is best for all-round economy and flavor quality. Extract-conc. gives longest shelf-life.
Cola	Natural	Extract or emulsion	4 oz.	Necessary flavor and color can be incorporated in a 4-oz. strength. Some additional acid may be needed, however. Because of deep color, either extract or emulsion can be used.
Cream soda	Imitation	Extract	1 oz. or 2 oz.	A very satisfactory product can be made with aromatic chemicals. Extract affords better, easier dispersion.
Ginger ale	Natural	Extract	4 oz. or 2 oz.	Flavor bouquet composed mainly of citrus oils, with some flower and spice oils. Extract needed to produce a clear beverage.
Grape	Imitation	Extract	2 oz.	Combination of grape extractives, juice, wine, and aromatic chemicals gives excellent flavor with 2 oz.
Grapefruit	Natural	Concentrate Emulsion	1–10 1–17 or 2 oz.	Acceptable flavor obtainable without juice, but juices give added appeal.
Lemon (table beverage)	Natural	Concentrate Emulsion	1–17	Should contain juice and show deep cloud.
Lemon mixer ("up" tang type)	Natural	Extract	2 oz. or ½ oz.	Due to solubility of lemon and lime oils, a superior product can be produced in the 2 oz. strength.
Lemon and lime (table beverage)	Natural	Emulsion	2 oz.	An emulsion necessary to produce deep cloud.
Orange	Natural	Concentrate Emulsion	1–10 1–17 or 2 oz.	If economy is prime consideration, 2 oz. recommended. There is marked difference, however, in flavor quality of a juice orange and one that contains no juice.
Punch	Natural and imitation	Concentrate Emulsion	1–17 2 oz.	In general, there are two types—citrus and berry base. Citrus punch should contain juice and be no more conc. than 1–17. Berry punch can be part artificial with conc. as high as 2 oz.
Raspberry	Natural and imitation	Extract Concentrate	4 oz. 2 oz.	There are some good imitation raspberry flavors available using natural extractions and imitation fortifiers, but best flavor is obtained with true fruit.
Root beer	Natural and imitation	Extract or emulsion	4 oz.	Root beer is made from oils of sassafras, sweet birch, wintergreen, cassia, spice, citrus, vanillin, and other materials. Finished product is deeply colored with caramel, which occupies volume in extract.
Strawberry	Natural and imitation	Extract Concentrate	2 oz. 4 oz.	A mixture of true fruit and imitation flavors has a slight edge over straight true fruit flavor.
Tom Collins	Natural	Emulsion Concentrate	1–10 1–17	Best flavor base is made with heavy emulsion of lemon and lime oils in liberal quantity of concentrated juice.

disks. So extra filter aids must be used. These take the form of very fine, completely insoluble powders, most common of which are magnesium carbonate and diatomaceous silica.

Filter aid is added to the extract before any precipitate has formed and is allowed to mix thoroughly. When water is added and the oily precipitate forms, it comes into physical contact with the powder and adheres to it. Mixture is agitated several hours, then powder is allowed to settle. Clear extract is decanted and further filtered and polished. The heavy cake is also filtered and the filtrate added to the clear extract.

Emulsions

A simple flavor emulsion is prepared by thoroughly mixing the oils with a calculated amount of emulsifying agent, then adding water until desired consistency is reached. In order to keep the emulsion homogeneous, viscosity and specific gravity are so regulated that they are compatible with these characteristics of the individual ingredients. Because ability of emulsifying agents to hold oil in suspension is proportional to particle size, the oil particles are then reduced by milling or homogenizing.

There are no clear emulsions. This is because the material is not actually in solution, but is held in suspension. Therefore, emulsions are used where the "flavor cloud" is not detrimental to finished product. In flavoring soft drinks such as orange, lemon, lime and root beer, the cloudiness is used to great advantage.

The cloud is nothing more than suspended oil particles that diffuse light and cause the cloudy effect. But the amount of flavor oil present in the finished drink is usually too small to create sufficient cloud, so a neutral oil has to be added.

Finished soft drinks have specific gravities of approximately 1.05, whereas most flavoring oils are less than 1.00. This means something must be done to weight down, or "balance", the flavoring oils.

Most popular "weighting" materials are brominated olive or vegetable oils. These have high specific gravities, and addition of small quantities to the flavoring base easily brings it to the desired point. This "balancing point" is determined by the bottling formula for the finished drink. The amount of sugar used and carbonation of finished drink largely determine its apparent specific gravity. Dissolved gas has the effect of lowering actual gravity.

In manufacture of emulsion flavors for other than beverage purposes, it is necessary only to completely emulsify the flavoring oils, and balance the flavor itself. No cloud is required in the finished product. As a result, the job is much easier.

Concentrates

To the flavor manufacturer, "concentrate" means a flavor base wherein all, or part, of the flavor comes from actual concentration of natural fruit or juices. For most flavor purposes, there is a limit to degree of concentration that can be reached. This necessitates adding further flavor to achieve an acceptable product.

Berry flavors are much more delicate than citrus, and the ordinary systems of vacuum concentration are not sufficient to produce an acceptable flavor. Fruit is usually purchased frozen, allowed to thaw, and pressed to obtain all the juice. Water is then removed very carefully so as not to cause loss of any of the delicate flavor notes.

Then the remaining pulp and seeds are macerated in an alcohol-water mixture. Mixture is concentrated by distillation and added to the concentrated juice.

Citrus flavor concentrates are made by adding properly balanced emulsion bases to commercially concentrated juice. Amount of juice desired in the finished product regulates the formulation. It is difficult, if not impossible, to thus create a completely homogeneous product.

Natural or true fruit flavor concentrates usually are somewhat weak in flavor strength or character. To overcome this problem, there are added other stronger natural flavors that are compatible with the concentrates.

It would be impossible at the present time to have berry concentrates of acceptable strength without these natural boosters.

Flavor base is usually preserved with alcohol, propylene glycol, or benzoate of soda, but this is not sufficient to keep it from spoiling or oxidizing over an indefinite period. Therefore, all concentrates should be stored in a cool, dark place and used as soon as possible.

Artificial Flavors

There is a great deal of confusion as to precisely what constitutes an artificial or synthetic flavor. Under Government labeling laws, a flavor product that derives any of its flavor from a synthetically produced material must be labeled an "imitation" or artificial flavor.

This is true even though the synthetic contributes only a small amount to the finished flavor. It is also true even if the synthetic is naturally present in the actual flavor of the fruit or herb.

This leads to the three following classifications of imitation flavors:

1. One containing only synthetic chemicals as flavoring agents.
2. One containing natural flavor plus synthetics native to the particular fruit or herb.
3. One containing natural flavor plus synthetics foreign to the flavor.

Synthetic chemical compounds used as flavoring agents are mainly oxygenated compounds found in nature. However, man has been able to produce most of them synthetically, cheaper, and/or better than nature. Vanillin, the characteristic flavor of vanilla beans, is a good example. It was originally obtained from vanilla beans, but the process was very expensive in proportion to the amount obtained. Then eugenol from oil of cloves emerged as a cheaper source. In recent years, vanillin has been completely synthesized from wood pulp.

Synthesized chemicals are used in flavor manufacture because they are economical, uniform, and available in stronger, more purified forms than their natural counterparts. They offer an ideal means for obtaining an individual flavor note of uniform character and controllable strength.

What Type of Flavor?

When should there be used an extract or an emulsion . . . a true fruit or imitation flavor . . . a highly concentrated flavor or one of lesser concentration?

The problem of extract vs. emulsion is usually solved by asking yourself: Do I need cloud in the finished beverage? All emulsions produce some cloudiness. On the other hand, extracts produce clear drinks and cannot be used where a cloud is necessary. Some beverages are so deeply colored that the cloud cannot be seen, so you can use either form (see Table).

Concentrates come in both extracts and emulsions. The one to use is determined by your desire for juice and true fruit flavor.

Competitive practices and flavor preferences of your individual market help determine whether a true fruit flavor or an imitation should be used. Imitation flavors are less susceptible to oxidation and spoilage. They should be used whenever the beverages have to stand up for long periods of time. In other instances, an imitation flavor is the only type available.

When cost is not a factor, and where there are no objections to a preservative, true fruit flavors (when available) are best. In citrus flavors, the technology is far advanced. Here, only true fruit flavors should be used.

Continuous HOT-AIR ROASTER

Simple and efficient, it processes cocoa beans uniformly, economically, and in minimum space

HARVEY T. GHIRARDELLI and JOHN SHEFFMAN

Respectively, Vice-President, D. Ghirardelli Co., San Francisco, and Vice-President, John Sheffman, Inc., New York City

Just set the temperature, crack the steam valve, and pull the starting lever.

That's all you have to do with the new continuous, vertical-type, hot-air cocoa bean roaster now in operation at the D. Ghirardelli Co. plant in San Francisco. After that, the roaster is on its own—needs no further manual attention.

A development of Emmericher Maschinenfabrik (Emmerich, Germany), this Probat roaster can turn out uniformly roasted beans at 1 ton an hour. And it's also won these other notable benefits at Ghirardelli's:

- **Handles cocoa beans gently, without breaking them or exposing the inner nibs to roasting heat.**
- **Occupies a minimum of floor space, since the roaster is vertical in design.**
- **Has advantage of very few moving parts, with operation at low cost.**
- **Enables an operator to shut down the roaster at the end of a shift without emptying it.**
- **Avoids fire hazards, since only steam-heated air is employed for the roasting.**

Aside from roasting cocoa beans, this unit can also be used for roasting nuts and similar items, as well as for drying different large-particle-size foods.

In operation cocoa beans are bucket-conveyed from a cleaner, on the floor below, up into a feed hopper directly over the roaster. Feeding of beans is automatically controlled by a pair of mercury switches located near top and bottom levels inside the hopper. As beans fall below the lower level, pressure is taken off the switch—restarting the bucket elevator's feeding of beans into the hopper. Then, as the beans reach the upper level, feeding by the elevator is automatically stopped.

From hopper, beans are gravity-fed, at the rate of 2,200 lb. per hr., into the 4x12x12-ft. roaster. Flow through the roaster is inside a chute consisting of a staggered series of perforated plates that cause the beans to roll gently—and also reverse their rotation during some of the travel. In this way, beans are uniformly exposed to the hot air blown through the perforated plates, eliminating spot-heating and poorly roasted cocoa beans.

The perforated plates are made of specially treated alloy steel that resists distortion due to high roasting temperatures. Perforations that permit passage of hot air are of 4 mm. dia. Width of the 12x12-ft. grids varies from 4 to 12 in.

The plates extend through three heating zones. In each, a uniform flow of air, heated by a series of triple-bank, steam-heated, finned-type heating units, penetrates the perforated chute to roast the beans.

Temperature of beans leaving the first zone is 225 deg. F., and it is 275-300 in the other two zones. Steam pressures vary according to temperature and roasting time desired. But they do not fall under 90 psi. To roast each 100 lb. of cocoa beans, approximately 37,500 Btu's are needed.

A thermostatic control of cocoa bean flow automatically maintains the temperature of the roasting beans, regardless of steam fluctuations. Roasting temperature is manually adjustable and, when once set to the desired roast, uniform roasting is then assured without any need of attention.

From the third heating zone, roasted beans are gravity-fed through the perforated chute into the cooling zone. As the beans leave this zone, their temperature drops to a little above room temperature.

A Sirocco-type (radial vane) blower, hooked up to a 5 hp. motor, pulls air through the cooling zone, then upward through the three heating zone, and finally through the exhaust near the top of the roaster.

According to type of roast, volume of air is manually varied by a damper

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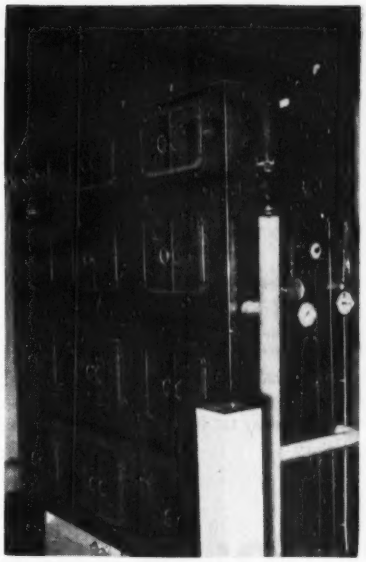
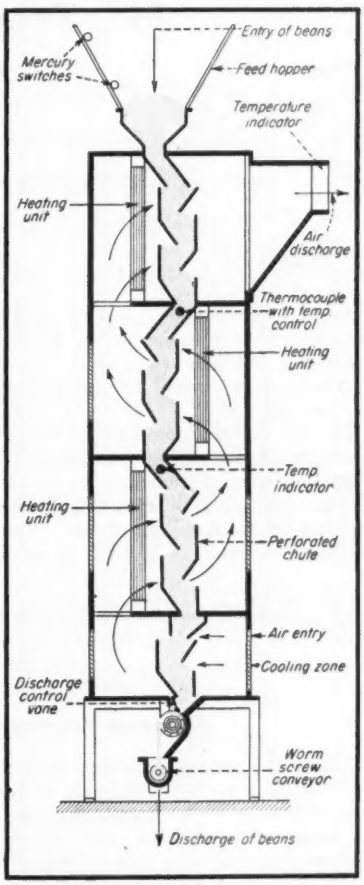


COMPACT vertical unit is handling 1 ton of cocoa beans hourly at Ghirardelli chocolate plant.



HOW beans are roasted. From supply hopper, beans gravitate into perforated chute, to carry through three heating zones and one cooling zone. After cooling beans, incoming air that has acquired heat rises in flow countercurrent to falling beans.

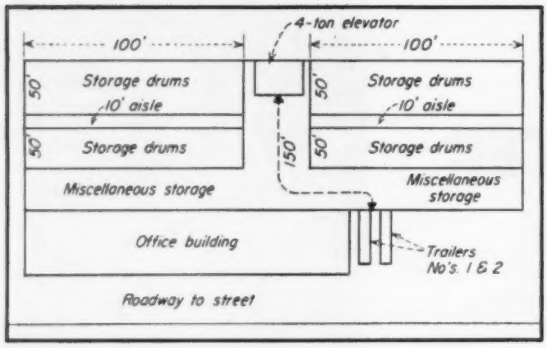


FIG. 1. **WAREHOUSE:** Drums are stored on 3rd floor. Average distance from 3rd floor storage to elevator is 60 ft. Distance from 1st-floor elevator to trailers at shipping dock is 150 ft.

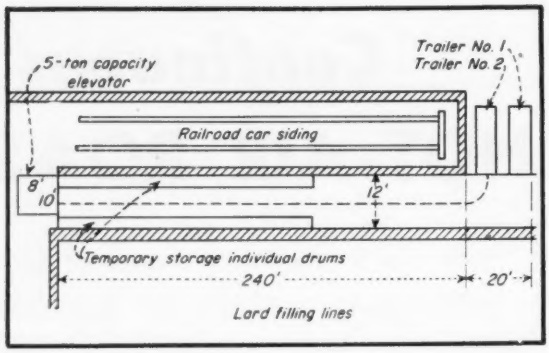


FIG. 2. **REFINERY:** Drums are temporarily stored on 1st floor awaiting elevator. Average travel, trailer to storage, is 200 ft. Average distance from elevator on 7th floor to storage is 75 ft.

Pinpoints Cost-Cutting Steps In Materials Handling

Look to a shift from manual to mechanical handling to win you substantial savings. Here's case history—spotlighted at IIT—that demonstrates more dollars-in-pocket and space-in-plant for packer who handles drums

FE STAFF

With approximately 1 out of every 3 dollars of today's industrial payroll expended on materials handling, basic knowledge on how to analyze problems in such unit operations is a "must" for every progressive engineer in the food industry.

In the recent materials handling classes at Illinois Institute of Technology, Chicago, actual case histories were prepared and studied.

This present IIT report* concerns a meat packer's problem in the handling of lard. The analyses indicated that an investment of $18,125 in mechanization not only would pay for itself in the first year's operation but would also effect a saving of $3,075.

Further, the mechanized system of handling would reduce by one-half the amount of storage area required—making available 10,000 sq. ft. of space for other products.

During the heavy kill months (September to November) in the meat packing industry, this company was faced with the problem of temporarily putting up unprocessed lard from these operations in 55 gal. drums. This lard was stored in a warehouse a few miles from the lard processing plant.

At times when this material was required in the refinery it was trucked in from the warehouse. The drums weighed approximately 45 lb. each.

Now for the comparisons—

* Prepared for IIT materials handling class by Kenneth J. Hlavin, plant engineer, Riley Steel Products Co., Cicero, Ill.

Systems Described

Current Practice

Under the present procedure each drum is handled by hand truck from the warehouse to the trailer truck and from the trailer to the seventh floor in the processing plant by means of hand truck and elevator. The study here presented is concerned only with the moves just described.

At the warehouse, the present method entails four men trucking on two-wheel hand trucks to the elevator and five men trucking similarly to the trailer trucks. Our Fig. 1 shows the average trucking routes at the warehouse.

This variable is due to the demand for use of the elevator on other floors. The seven-floor building presents serious elevator problems, and temporary storage of the

Proposed Method

Projected is use of the following modern equipment.

4,500 pallets to accommodate the average inventory of 18,000 bbl. at any one time in the warehouse.

Three 2,000-lb. electrically operated fork lift trucks.

One hand-operated electric pallet-type hydraulic truck.

In cycle of new operations, drums would be stored two pallets high in the warehouse, thus using only one-half of present area (20,000 sq. ft.).

Pallets would be carried by one electric-operated fork-lift truck to elevator at warehouse.

A second electric fork-lift at dock level would unload these pallets and transport them to trailer trucks.

Systems Described (Cont'd)

Current Practice

drums was necessary while waiting for an elevator. Because of this condition, each drum is picked up and set down twice rather than once. During the return trip of the hand truckers no useful work is performed.

On the seventh floor the drums are removed from the elevator by two hand truckers and put into adjacent temporary storage. Floors in this area are slippery. Trucking conditions are poor because of the lard getting on the floor and melting in the room temperature of 90 deg. F.

Fig. 2 reveals the layout at the processing plant. Here, the existing method calls for four laborers each carrying one drum on a two-wheel hand truck from the trailer truck to the temporary storage area. Capacity of the elevator limits loads to 15 to 20 drums.

Proposed Method

At packing house, drums on pallets would be unloaded by a third electric lift truck and transported to temporary storage area near elevator going to lard refinery.

According to availability of elevator, these pallets would be loaded onto elevator by third lift-truck.

In lard refinery, these pallets would be unloaded, by a hand-operated electric pallet truck, to temporary storage areas.

In general, reverse cycle of operation would apply to handle of pallets to be put in warehouse storage, just as reverse cycle applies to present operation.

Use of electric fork-lift and pallet trucks precludes any possibilities of gasoline fumes around warehouse and packing house.

Handling-Time Analyses

Current

Warehouse Storage to Elevator	Min.
1. Pick up drum	0.50
2. Truck to elevator (.0065 x 60 ft)	0.39
3. Set down drum in elevator	0.40
4. Return to drums (.0043 x 60 ft.)	0.26
	1.55

Elevator to Trailer Truck	
1. Pick up drum	0.50
2. Truck to trailer (.0065 x 150 ft.)	0.98
3. Set down drum	0.40
4. Return to elevator (150 ft. x .0043)	0.65
	2.53

Trailer to Temp. Storage at Packing House	
1. Pick up drum	0.50
2. Truck to temporary storage (.0065 x 200 ft.)	1.30
3. Set down drum	0.40
4. Return to trailer (.0043 x 200 ft.)	0.86
	3.06

Loading Elevator at Packing House	
1. Pick up drum	0.50
2. Truck on to elevator (.0065 x 40 ft.)	0.26
3. Set down drum	0.40
4. Return to temporary storage (.0043 x 40 ft.)	0.17
	1.33

Unloading Elevator	
1. Pick up load	0.50
2. Truck to temporary storage (.0070 x 75 ft.)	0.52
3. Set down drum	0.40
4. Return to elevator (.0048 x 75 ft.)	0.36
	1.78

Proposed

Warehouse Storage to Elevator	Min.
1. Pick up pallet	0.20
2. Truck to elevator (.003 x 60 ft.)	0.18
3. Set down pallet	0.10
4. Return to pallets (.0025 x 60 ft.)	0.15
	0.63

Elevator to Trailer Truck	
1. Pick up pallet	0.20
2. Truck to trailer (.003 x 150 ft.)	0.45
3. Set down pallet	0.10
4. Return to elevator (.0025 x 150 ft.)	0.37
	1.12

Trailer to Temp. Storage At Packing House	
1. Pick up pallet	0.20
2. Truck to temporary storage (.003 x 200 ft.)	0.60
3. Set down pallet	0.10
4. Return to trailer (.0025 x 200 ft.)	0.50
	1.40

Loading Elevator at Packing House	
1. Pick up pallet	0.20
2. Truck on to elevator (.003 x 40 ft.)	0.12
3. Set down pallet	0.10
4. Return to Temporary Storage (.0025 x 40 ft.)	0.10
	0.52

Unloading Elevator	
1. Pick up pallet	0.25
2. Truck to temporary storage (.003 x 75 ft.)	0.22
3. Set down pallet	0.15
4. Return to elevator (.0025 x 75 ft.)	0.18
	0.80

Costs Compared

Present

Recap of Handling Time per Drum	Min.
Warehouse storage to elevator	1.55
Elevator to trailer truck	2.53
Trailer to temp. storage at packing house	3.06
Loading elevator at packing house	1.33
Unloading elevator	1.78
	10.25

Proposed

Recap of Handling Time Per Pallet	Min.
Warehouse storage to elevator	0.63
Elevator to trailer truck	1.12
Trailer to temp. storage at packing house	1.40
Loading elevator at packing house	0.52
Unloading elevator	0.80
	4.47

Costs Compared (Cont'd)

Present

Handling Cost Per Drum

10.25 (min.) x $\frac{\$1.42}{60}$ = $.24 each

Total Handling Cost Per Yr.

100,000 (drums) x $.24 each = $24,000

Notes: Labor rate on job $1.42 per hr. Yearly volume of drums handled 100,000.

Proposed

Handling Cost Per Drum

4.47 (min.) x $\frac{\$1.50}{60 \times 4 \text{ (drums per pallet)}}$ = $.028 each

Total Handling Cost Per Yr.

100,000 (drums) x $.028 each = $2,800.00

Notes: Labor rate on job $1.50 per hr. Yearly volume of drums handled 100,000.

Savings

Operating Expenses	
Cost per yr., present	$24,000
Cost per yr., proposed	2,800
Gross operating savings	$21,200
Cost of Installing Proposed Method	
4,500 pallets @ $1.25 each	$ 5,625
Three 2,000-lb. electric fork-lift trucks @ $3,500 each	10,500
One hand-operated electric pallet truck	2,000
Total installation cost	$18,125

Thus installation is amortized in less than one year, since annual savings are superior (by $3,075) to equipment costs.

Takes Top Award

No. 1 honors went to the paper on which the accompanying article was based.

The competition, sponsored by Clark Equipment Co., spotlighted advanced materials handling techniques.

Our recent special feature, "Mechanize Your M-H? Here's How to Figure It—Ways and Dollars," (FE Dec. '53, p. 133) was based on the runner-up paper.

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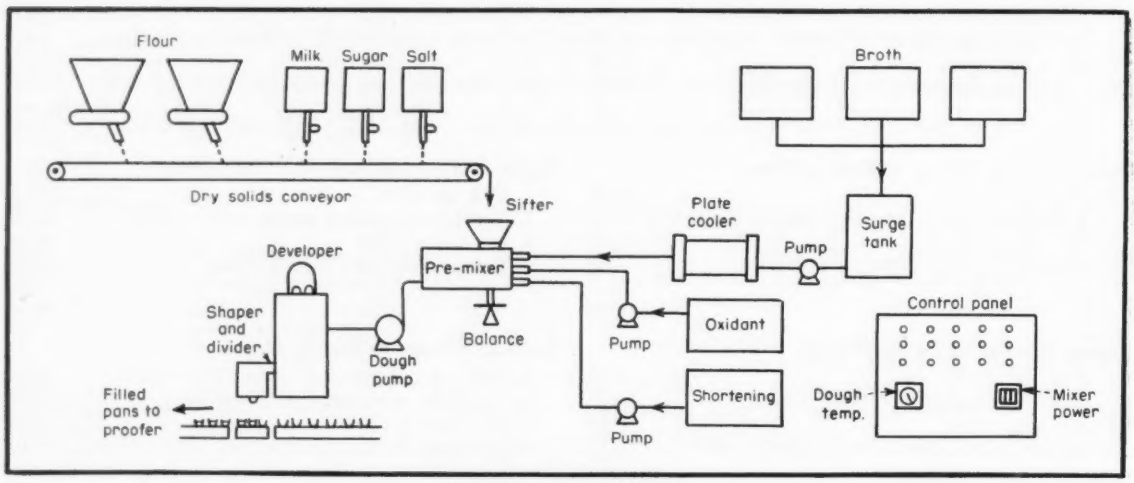


BAKER PROCESS

Makes *Better* Bread *Faster*

Simplicity, economy called further features of new system, already introduced part-time in half a dozen baking plants

FE STAFF

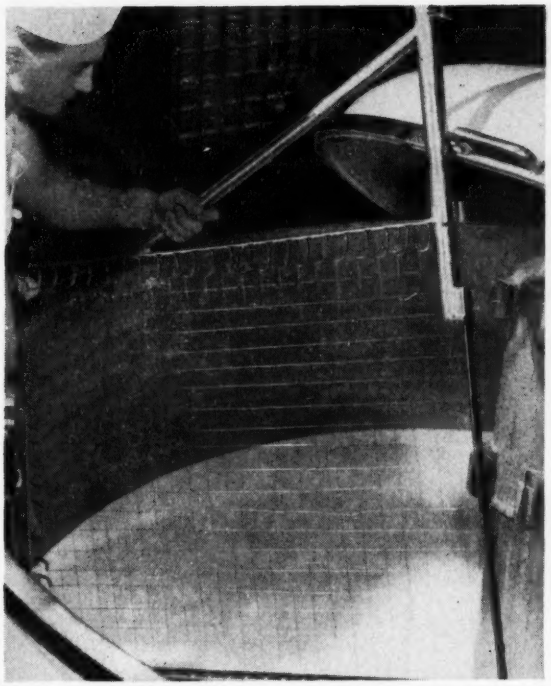
New speed in mixing, plus simplified, continuous, and economical operations and improved product quality are advantages reported for the new Baker bread-making process. It is named after its inventor, John C. Baker, director of research, Wallace & Tiernan Process Co., Belleville, N. J.

During the past four months, installations have been on part-time production basis in six different bakeries. New equipment fits existing facilities for wrapping and slicing and at present is producing up to 68 loaves per minute.

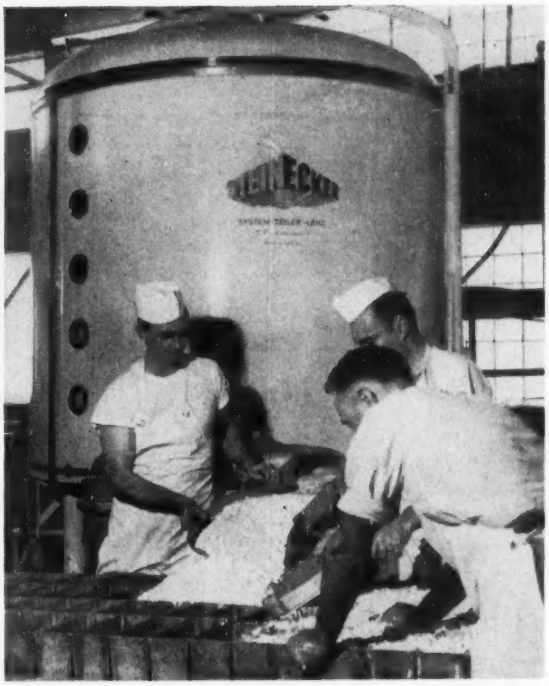
Our diagram shows how system works. All solid products are fed by vibrators controlled from the master control panel. Liquids automatically are fed and controlled via variable speed pumps. The premixer is an interrupted feed unit. It is placed on a scale-balance that will start and stop the dry feed to its own sifter. Thus, weight of dough piece going to panner is controlled.

Ingredients can be added or subtracted in the formula automatically from the panel without affecting the controlled dough-piece weight. The "developer" actually is a vari-speed impeller-type mixing chamber operated

(*Turn to page 171*)



ONE of attachments used with machine is curd knife, being placed on revolving center shaft by Eldor Hanni.



FINISHED curds flowing from unit—½ ton in 11 min. Whey discharges from another outlet to storage tank.

Meet the *Kasefertiger*

Mechanical Cheesemaker

New machine cuts curd-preparation cost 20%, saves floor space, reduces labor. Seen replacing vats

FE STAFF

(Photos courtesy Edgar G. Mueller, Mayville, Wis.)

A great stride toward mechanization of cheesemaking in this country was taken about a year ago when G. Hanni & Sons, Mayville, Wis., installed a revolutionary machine—the Steinecker *Kasefertiger*.

In the opinion of Gottfried Hanni, proprietor of the company, this German machine will replace the age-old vat method of making many types of cheeses. For, he says, it saves time, labor, and effort, and makes better and more uniform cheese under higher sanitary conditions.

Developed in Germany

Hanni heard about the new unit while visiting in Switzerland. So, with Frank Ryser of Chicago, he traveled to Germany to learn more about it. They became enthused and purchased one of the machines—the first to be brought into this country.

"It's a pleasure to make cheese this new way," declares Hanni. "A cheesemaker's job commonly involves long hours, seven days a week. For no one has discovered how to keep cows from giving milk on Sundays. But with the new machine there is no more drudgery. The factory can turn out more cheese in less time."

The Steinecker, as plant people call it, comprises a jacketed, vertical vat that will hold 11,000 lb. of milk. This vat is equipped with a motor-driven central shaft to which may be attached agitators, curd knives, or "swimming floats." A tight fitting cover and vacuum source complete the unit, the former accurately balanced to enable easy manual opening and closing.

In operation, the machine is filled with pasteurized milk, which is then heated to the desired "setting" temperature by injection of steam into the unit's jacket. Rennet, culture, and color are added with agitation. then the mixture is allowed to set for 30 min. Knife is attached to center shaft for cutting of curd.

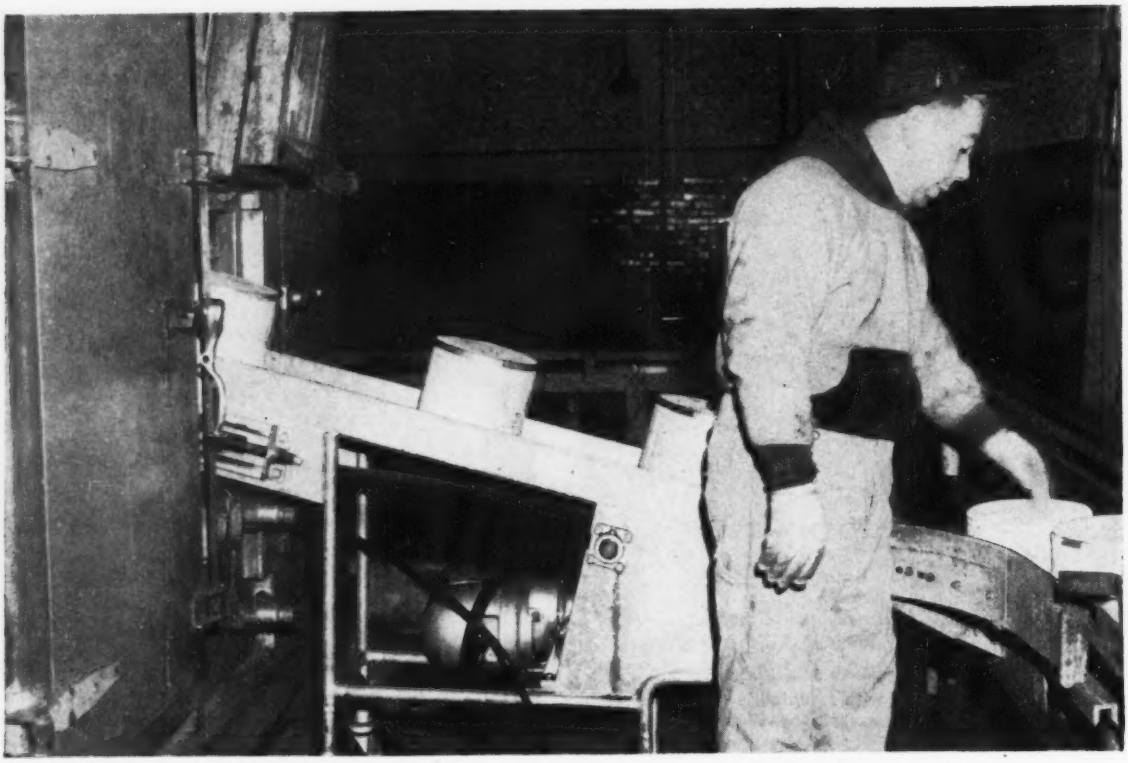
Following cutting, the knife is replaced with agitator paddles to provide gentle movement of curds and whey during heating and subsequent holding.

Agitators are removed and swimming float is attached to shaft. Then vacuum is applied to unit to aid in separation of curds from whey. When separation is complete, machine is emptied—curds flowing to cheese hoops, whey to a holding tank. A half ton of curd can be discharged from the machine in 11 min.

Numerous Benefits

The equipment takes less space than the open vats, is easier to clean, and its use eliminates manual cutting of curd and lifting it from the vat. Another advantage is greater uniformity in moisture content of entire batch of curds, thus bringing about improvement in cheese quality.

To date, the following types of cheese have been made on the Steinecker at the Hanni plant: Port du Salut, Nordost, blue, brick, baby Edam, caraway baby Edam, and caraway block Edam.



PACKAGED ICE CREAM is fed direct from holding room into trailer, via specially designed portable conveyor.

Sub-Zero Holding Room on Wheels

Special trailer efficiently transports ice cream and serves as economical temporary branch-plant holding room during defrosting-cleanup-repair periods

To speed loading and unloading, Abbotts Dairies, Inc., Philadelphia, has developed special ice cream transport trailers. And the unique features in the design of these trailers also provide these important benefits:

- **Increased pay-load.**
- **Less labor for loading and unloading.**
- **Ice cream temperature economically held at −20 deg. F.**
- **Load shifting prevented, regardless of percentage fill.**
- **No loss of quality throughout mobile-storage of ice cream.**

Now let's observe the loading operation.

Packages of ice cream travel continuously by conveyor from the hardening or storage rooms to the trailer loading dock. Here, automatic transfer is made to a short portable conveying unit. Through a minimum size opening in the trailer rear-end, this conveyor empties onto a permanently installed belt conveyor inside the body. Driven by its own 1-hp. motor, also located inside the vehicle, this latter conveyor extends the length of the trailer. But it is designed to occupy minimum pay-load space.

Steel plates, which are hinged to one side, fold over the conveyor so that packages of ice cream may be loaded in the area above and beneath the unit without interfering with conveyor operation.

Cargo Shifting Prevented

As each 6-ft. section of trailer is loaded, steel-frame, wire-mesh gates, hinged to the walls, are closed. This confines the product in each section and prevents the load from shifting, even though products are stacked to varying heights, or though some compartments may be empty.

Loading, assembling orders, inventorying, and unloading are as readily accomplished at night as during daylight hours. Guard-protected lights, supplied with current from plant source, provide adequate lighting inside the trailer.

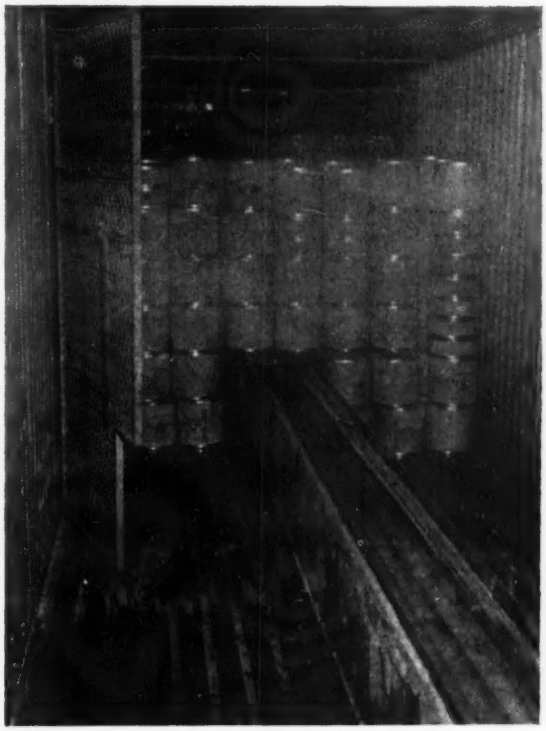
Refrigeration System

The trailer carries its own heavy-duty, plant-type refrigerating compressor assembly, accessibly suspended beneath the body. The compressor may be operated in transit by its own gasoline-powered engine, or on arrival at destination by an electric motor using current from the main or branch plant.

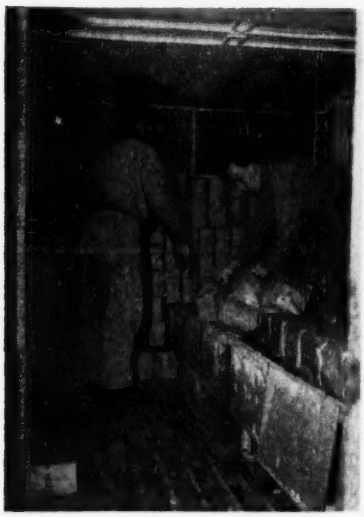
Structural members of the body, and its exterior, are made of aluminum. The body is lined with stainless steel, the side walls being corrugated. Confined in these corrugations are the tubes which carry the Freon refrigerant. Between tubes and metal exterior, enough Styrofoam insulation is placed to easily maintain a −20 deg. F. temperature in the trailer.

It is largely due to the weight reduction of the Abbotts engineered all-

SMALL FEED DOOR in end of trailer safeguards against loss of refrigeration.

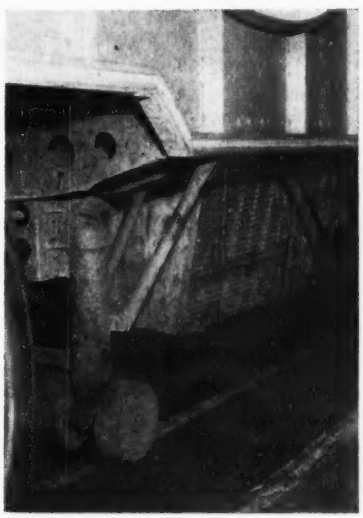


HINGED GATES made of wire mesh prevent cargo from shifting.



TWO WORKERS keep pace with package conveyor in trailer.

CORRUGATIONS provide area for refrigerant tubes. Note light (arrow).



COMPRESSOR HOUSING is located accessibly beneath trailer body.

aluminum body construction that maximum pay-load can be transported —despite heavy insulation, heavy-duty refrigeration system, and self-contained loading conveyor.

How Unit Is Used

Since the temperature in the trailer can be maintained sufficiently low at all times, loading can be so scheduled that it does not interfere with other loading-dock operations. Refrigeration in transit from the self-contained, adequately powered refrigerating system, assures protective temperatures while the vehicle is on the road.

Saves Labor, Cuts Load Time

Unloading need not be rushed at the branches either, since —20 deg. F. temperature can be held for an indefinite period. In fact, the mobile unit serves for weeks at a time as an ice-cream holding room. This permits branch low-temperature storage areas to be conveniently defrosted, cleaned, and repaired without interrupting delivery service.

The automatic conveyor-feed system brings packages to the stacking area where, with least time and effort, workers can stack them in place in maximum pay-load volume, anchored against damage from shifting. The system has reduced labor required for loading and materially reduced loading time.

High quality and convenience of 9 different "heat-and-eat" Oriental dishes have quintupled business for enterprising Brooklyn firm. This "photo-visit" reveals how handy items are prepared for growing retail, restaurant, and institutional food trades

John V. Ziemba
Associate Editor, "Food Engineering"

DAILY PRODUCTION of delicious Chinese egg rolls tops 7,000. Here, special order is separately assembled and packed.

Precooked Frozen Chinese Food

An impressive 500% climb in sales over its first year's business is the enviable achievement chalked up in a mere half-decade by Temple's Frosted Foods, Inc., Brooklyn.

President Bowden Goon and his sales manager, Sidney Schwartz, counted on two things when they initiated their rather "chancy" venture of manufacturing a complete variety of quality pre-cooked frozen Chinese foods:

- **The feeling that every family enjoys a culinary change of pace—a meal that's out of the ordinary, like quality Chinese dishes.**
- **The object of abolishing the fuss and bother of packing the family off to a Chinese restaurant or of making elaborate preparations at home.**

It was not that these factors could be expected to bring a great overnight clamor for the foods when Temple went into the business. In truth, they didn't.

For Long Pull

Rather, these were the solid influences relied on for the long pull. And as operations proceeded they had a steady, business building effect—so that today the firm is finding a constantly broadening market throughout the eastern part of the country.

Daily production now amounts to 100 cases of egg rolls, packed three 2½-oz. rolls to a cellophane-wrapped carton and 24 cartons to a case; 100 cases each of chow mein and fried rice, packed 24 cello-wrapped cartons (12 oz.) to a case; and 35 cases of won ton and egg drop soups, packed 24 paper cups (15 oz.) to a case.

Prepared are three varieties of chow mein—chicken, shrimp, and vegetable. Also made are chicken noodle soup and chow mein noodles, the latter being offered in 10-oz. cartons.

Processing Routines

Briefly, here's how the Chinese specialties are prepared in Temple's efficient operation:

Egg Rolls—Shrimp, celery, pork and onions are diced, then mixed along with spices in approximately 40-lb. batches. An Urschel slicer cuts celery into ⅛-in. dice. About 2 oz. of this mix is placed on a sheet of egg-noodle dough (purchased according to specifications from a local macaroni manufacturer), and then hand-formed into a roll (1¾ x 5 in.). An egg paste is used to seal the dough.

Rolls are packed 72 to a wire-basket tray, and 20 trays are loaded onto a portable rack that's pushed to the kitchen. Here, a trayload of egg rolls is submerged 2½ min. in one of the three batch-type, deep-fat fryers. Temperature of the cooking fat is 350 deg. F.

The trayload of rolls is then removed from the fryer and placed on an inclined draining table attached to the fryer. Draining of excess fat takes about 2 min.

Trays are then loaded onto racks for room-temperature cooling. Then the rolls are packed three to each carton. Cartons are cellophane-wrapped by a Hayssen machine.

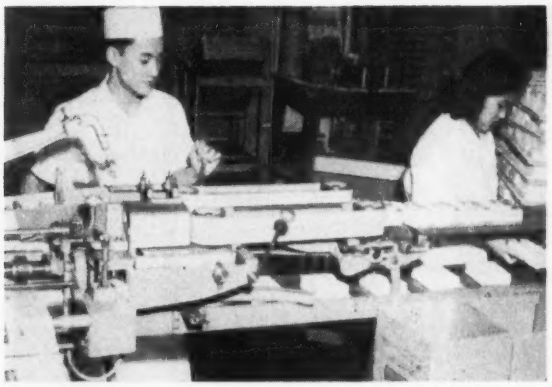
Furthermore, the egg rolls are also packed two to a cello bag as well as 25, 50, or 100 to a carton for institutions and restaurants.

Legerd*emain*

Chow Mein—Basic is the vegetable chow mein, which comprises celery, bean sprouts, onions, and spices. The others—chicken and shrimp chow mein—consist of the same ingredients,

Action Shots in Processing Rolls, Chow Mein, Soup

EGG ROLLS are deep-fat fried for 2½ min. in 350 deg. F. cooking fat. Excess fat is drained from rolls.



MACHINE-WRAPPED in heat-sealable cello, cartons (each holding three rolls) are packed 24 to case.

PREPARED in this kitchen are fried rice and three types of chow mein—shrimp, chicken, and vegetable.

CHOW MEIN is then cooled, and packed into 12-oz. cartons. Check-weighed cartons are then overwrapped.

FIRST STEP in making won ton soup is to roll ground pork in dough, parboil resulting kreplech.

NEXT, 9 kreplech are put in paper cups, along with chicken broth and sliced cabbage.

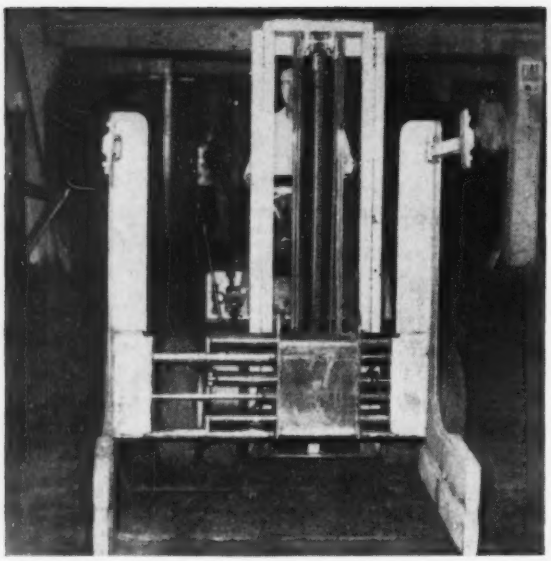
except the former contains chunks of chicken, the latter shrimp.

Batches (60 lb.) are cooked about an hour in kettles that are covered with lids. After removing from the fire and cooling, the chow mein is packed into 12-oz. cartons that are cello-wrapped.

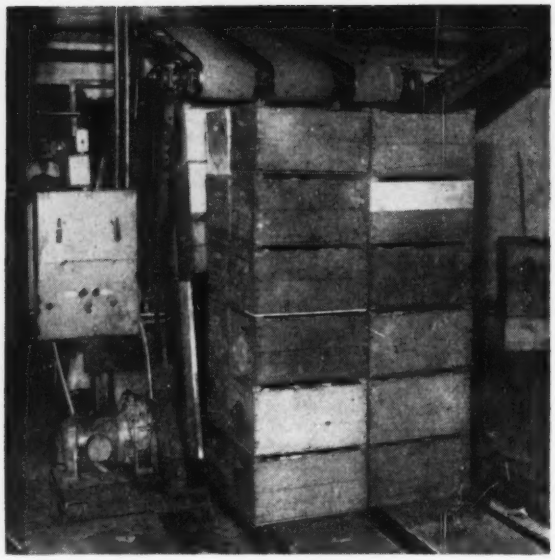
Fried Rice—Boiled rice is mixed and fried with fresh eggs, pork, soy sauce, onions, and selected spices. Batches (40 lb.) are then cooled and subsequently packaged in the same manner as chow mein.

Won Ton Soup—Making this specialty soup involves wrapping a small ball of pre-cooked ground pork in a 2½ x 2½-in. sheet of dough to form kreplech. These are parboiled and packed nine to a paper cup along with chicken broth and chopped, Chinese cabbage.

All packaged products are zero-frozen in two air-blast freezers—one 17 x 17 ft., the other 8 x 10 ft. Products are then distributed in refrigerated trucks.



CLAMP-EQUIPPED lift truck directly handles stacked boxes and/or lugs filled with fruit—no pallets here.



STACKS of fruit-filled boxes are fed to dumper via double-chain floor conveyor. Fruit goes to 2nd floor.

Their 5-Yr. Modernization

Comprehensive '53-'57 "step up" is tuned to streamline fruit operations in practical balance with growing receipts of raw materials. Entailed are: ¶ Structural changes. ¶ Additional buildings. ¶ Advanced processing machines. ¶ Improved materials handling equipment and techniques.

CLYDE R. SHINER

Staff Industrial Engineer, Apple Growers Assn., Hood River, Ore.

Forewarned by crop forecasts in 1951, which predicted a 100% increase in orchard production by '57, the Apple Growers Assn., Hood River, Ore., now has underway a notable 5-yr. plant-expansion program.

Past modernization and expansion of AGA's plant facilities has been continuous to keep pace with increasing grower production. However, this new plan is most significant, because–

1. New building sites are extremely limited.

2. Present buildings were not originally engineered to handle the increased volume.

3. Engineering changes must be made with extreme care and foresight.

4. Efficiency of methods and materials handling must be improved.

5. Efficiency and capacity of present mechanical equipment require careful study prior to recommendations for new machines.

6. Abilities and efficiencies of plant personnel must be geared to these transitions.

Capital expenditures for this stepwise expansion will be heavy. In the interest of economy, each recommended change must be studied, approved, and made an integral part, in proper chronological sequence, of this program.

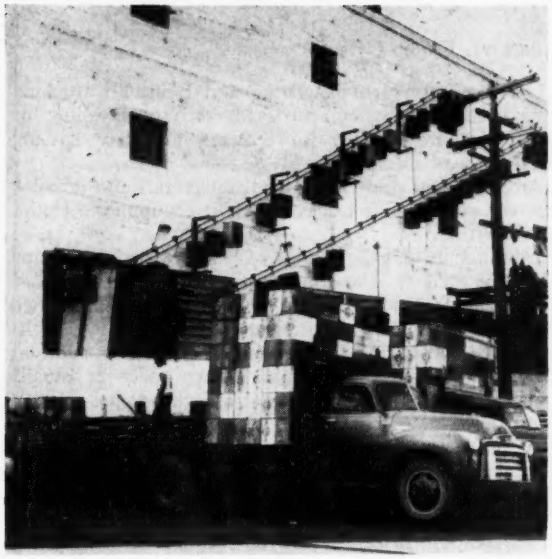
Formation and scheduling of the master plan is now in progress. It began with a cautious approach in which operation of the cannery, one of AGA's major units, was analyzed by an industrial engineer. Results of this initial study demonstrated the complexities involved in developing and scheduling the 5-yr. expansion.

As explained by J. E. Klahre, general manager, "In the past our policy was to make the best use of available facilities. As long as this was feasible there were economic advantages for grower-members.

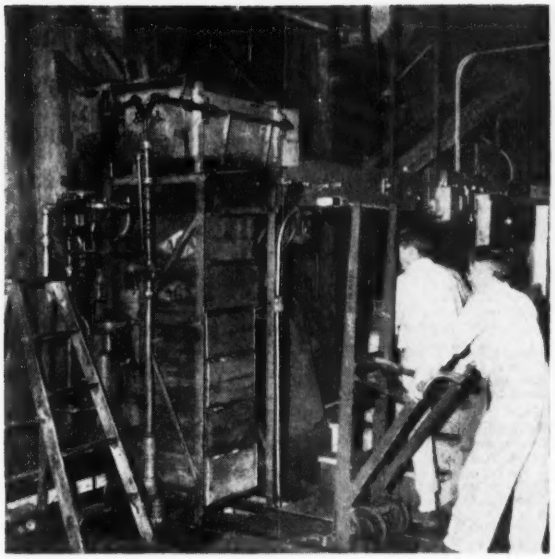
"However, a few years ago, when gradually increasing orchard production began to outstrip plant handling and processing facilities, a forced transition became imperative. From that time until 1951, it seemed that each succeeding annual budget involved major expenditures for buildings and equipment.

"These expansions were planned largely for our then-current needs. They weren't specifically integrated into a long-range plan designed to provide expanded facilities synchronized with the natural increasing orchard production. By 1952, existing orchards and additional new plantings had reached an annual production tonnage that nearly overtaxed our plant facilities. In addition, crop forecasts indicated that we would have to provide facilities to handle double the tonnage by 1957. It was clearly apparent that the time had come for long-range planning."

In AGA's Program



EMPTY lug and apple boxes travel on wall chain-hook conveyor. Top section moves 'em up, lower brings 'em down.



AT END of conveyor leading from size grading to pear ripening, stacker automatically piles lugs 6 high.

Is *Paced* to Coming Growth

Results of initial studies and analyses resolved AGA's need for a staff industrial engineer to assist and coordinate efforts of line executives and others in developing the best possible plant layout, incorporating improved material handling and processing methods for the present time, and at least 5 yr. in the future. Flexibility in plant design became a "must."

1953 Progress

This expansion and modernization program is a stepwise operation planned for completion in 1957, and it must continue smoothly even during seasonal peaks.

Preliminary studies led on to the first steps in 1953: (1) Building, remodeling, and construction of new cannery space where such was economically feasible, (2) improvement of receiving, sizing, pear ripening methods, and materials handling.

These were the year's two major efforts. The plans were developed separately, then closely integrated so work on both could proceed simultaneously and smoothly. However, for purposes of clear delineation they are listed herein as separate operations.

To increase cannery capacity from its present 8,900 tons to 18,000 tons of Bartlett pears will require the modernization and expansion of every unit operation, beginning in the field and ending at the finished, canned-product shipping department.

Boxes vs. Lugs

At the very outset, a prime problem in the handling of fresh fruit from field to plant was that of lug boxes vs. apple boxes, used for picking and shipping containers.

A good percentage of the apple packing boxes are used in the field to move fruit to the plant. After this, fruit is washed and graded, that proportion of it designated as fresh market grade being handwrapped and repacked in these same boxes. Remainder of the fruit goes to the cannery.

These apple boxes are not suitable as orchard containers for certain varieties of pears. Instead, lug boxes must be used. Both containers have the same dimensions, except in widths. Apple boxes are 12 in. wide; pear-picking lugs 14 in. Difference in dimensions made it necessary to design special industrial lift-trucks, floor chains, a box stack-dumper, and a chain-hook conveyor.

In not using orchard lugs for all picking, storing, and

430 Members . . . 1,750 Workers . . . 75% of Output

Apple Growers Assn. is a grower-owned cooperative consisting of 430 members representing 75% of Oregon's Hood River Valley apple and pear production. It operates six cold storage plants, five fresh fruit packing houses, a cannery, and warehouse.

Anjou and Bartlett pears and many varieties of apples are stored. Bartlett pears are canned during a 60-day operating period. Apples that aren't of fresh market grade, as well as special canning varieties, are processed as apple slices, sauce, juice, and vinegar.

In addition, there are smaller tonnages of cherries and peaches, which either are canned or packed for the fresh market.

Off-season employment is about 250. This increases to 1,750 workers during the seasonal peak. Also, the growers employ about 6,500 pickers for harvesting fruit.

handling, AGA saved money in 1953 and will continue to do so in the future. Approximately 135,000 apple boxes, representing about 25% of the pear crop, were used in place of the lugs. Net savings amounted to $.0345 per box, or $4,657.50 in '53.

In bumper crop years, 60% lugs and 40% boxes will be used, representing a greater net saving as well as eliminating a capital investment of $65,000 per 100,000 lugs not purchased. Realizing the advantages in actual net savings and opportunities to reduce investment in fixed assets made the efforts to design special methods and equipment worthwhile.

TABLE I—COMPARABLE COSTS of Unloading Trucks

	1952 Old Method		1953 New Method	
	Per Road Truck	Per Ton Unloaded	Per Road Truck	Per Ton Unloaded
Unloading Road Trucks				
Number of men	2	2	1	1
Man minutes	40	6.2	15	2.3
Road truck time at dock	20	3.1	10	1.6
Cost*				
Unloading labor	$.807	$.124	$.365	$.056
Equipment cost**	.014***	.002	.334****	.015
Road truck labor & equpt. cost	1.233	.192	.617	.099
Performance loss (Actual Std.)	(10%)	(10%)	(23%)	(23%)
Total	$2.259	$.350	$1.619	$.253

Unrelated cost incidentals are omitted to simplify comparisons. Yearly net saving amounted to $805 in 1953 on 8,300 tons delivered to cannery. This saving will increase yearly to $1,746 in '57, when 18,000 tons are received.

* All costs in this article are based on prevailing figures in fiscal year ending April 30, 1953.

** Operating ownership costs are computed here on basis of yearly depreciation 5% interest on capital invested, 2% for insurance and taxes, operating, and maintenance expenses. Operating hours per year are used as divisor to obtain operating cost per hour. (See p. 263–266 USDA Marketing Research Report No. 49, Washington, D.C., June 1953, for details on similar method.)

*** Cost is based on 1½ hand clamp-type trucks. Road truck driver used 1 part of time.

**** Cost is based on 2 Valley Evaporating Co. dock clamps and 1 Hyster ON-20 industrial lift truck with accessories and special clamp pad mechanism.

TABLE II—COSTS RELATED to Chain-Hook Conveyor System

	Pear Dumping & Sizing	
	1952 Method	1953 Method
Number of men	30	27
Pears dumped per hr	20 tons	20 tons
Labor cost per hr	$33.91	$30.70
Equipment cost per hr	.925*	1.18**
Total	$34.84	$31.88
Cost per ton	$ 1.742	$ 1.594

Unrelated cost incidentals are omitted to present an accurate comparison of methods. Yearly net saving in 1953 on 8,300 tons dumped is $1,228. This saving will increase yearly to a minimum of $2,664 when 18,000 tons are dumped in 1957.

* Includes operating ownership costs on 110 ft. of empty lug belt conveyors and on 180 ft. of empty apple box belt conveyors.

** Includes operating ownership costs on 485 ft. of chain-hook conveyor and 55 ft. of empty box belt and roller conveyor.

TABLE III—MATERIALS HANDLING Related to Pear Ripening

	1952 Old Method	1953 Interim	1957 New Method
Methods	Hand Trucks & Elevator	Industrial Clamp Lift Trucks	
Daily tonnage	150	150	300
Number of times handled	2.5	3.0	2.0
Number of men	12	8	10
Their man-minutes	17.2	15.5	15.0
Cost per ton processed			
Labor	$ .346	$ .347	$ .334
Equipment	.194*	.179**	.195***
Performance loss (Actual/Std.)	(118%)	(111%)	(15%)
Total	$1.177	$1.108	$ .572
Percent Cost to 1952	100	94	52

An accurate cost comparison is thus developed by omitting unrelated incidentals. Net saving in 1953 equals $572. This will increase to $9,830 yearly by 1957, per forecast of 17,280 tons of ripened pears. Planned method then will be in effect, and operations can be balanced to avoid excessive delays indicated in performance loss.

*1952 equipment consists of hand clamp trucks for 7 men and one 5-ton elevator.

** 1953 equipment consists of 2 hand clamp trucks and 3 Hyster YC-40 industrial clamp lift trucks.

*** 1957 equipment is same as 1953 plus 6 floor rolls 12 ft. long.

Pallets vs. Clamp-Lifts

Over several years, palletizing and clamp-lift trucking have been carefully compared for orchard handling of loads. Average orchard is 15 acres, and tree spacing favored use of clamps.

An additional study on in-plant operations also revealed that use of clamp-lift trucks was more economical. Here's why:

Elimination of pallets saves space. Two pallets occupy a total of 6 cu. ft.–the same storage space as 6 lug boxes. AGA cold storage space costs $0.22 a year per lug, based on careful analysis of all expenses involved. This results in a space cost of $1.32 per year for 2 pallets. In addition there is the factor that cold storage space is usually limited, often requiring rental–at a higher figure–of outside space.

Actually, this study used a figure of 33c. per pallet, since it was estimated conservatively that AGA would use the same space twice a year.

Pallets cost about $3.00-$3.50 each. They require repairs, (yearly); space (in use or stored); handling labor (to haul to point of palletizing and from depalletizing again to storage).

Conservative fixed-cost for a pallet operation–including 10% for depreciation, 5% interest, 2% insurance and taxes, and 6% repairs on a $3.00 original purchase price–comes to $0.69 annually. To this must be added the cold storage cubic requirement of a pallet (33c. annually), bringing total yearly cost to $1.02 exclusive of labor for handling them.

A standard palletized operation for all AGA operations would require at least two pallet sizes–one for lugs, another for apple boxes. It would require an estimated 45,000 pallets, with an initial cost of $135,000 and an annual fixed cost, including maintenance, of $45,900, based on 1952 plant handling and processing volume.

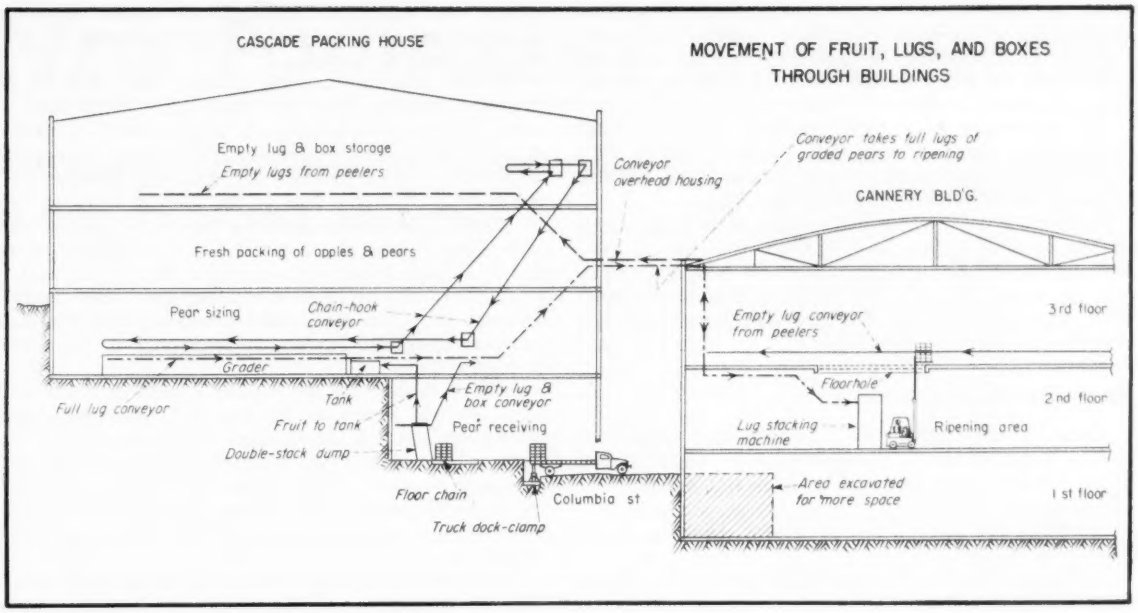
AGA developed its own clamp lift-truck specifications and requested manufacturers to quote prices on the units. Called for were gasoline-powered trucks equipped with oxycatalytic exhaust mufflers to eliminate carbon monoxide fumes. Lug or box unit loads would be 36 instead of 24. Thus, 8 instead of 12 trips would unload a road truck (normal load, 288 lugs). And the truck would be equipped with a clamp-lift with side-shifter attachment so that loads could be picked-up and set-down without the necessity of backing and turning.

Construction and Relocating

In 1953, construction began with the rebuilding of the east section of the cannery, which represents about one-third of the total processing floor area. Other moves included:

(1) Transfer of the pear receiving (truck unloading) and the pear-sizing operation, then located on the 4th floor in the east section of the cannery, to the 1st and 2nd floors of the packing house building across the street; (2) Abolishment of ramps by reconstructing floors in adjoining buildings to eliminate differences in their levels; (3) Excavation of the hill behind the 1st floor to increase headroom and so permit double-tiering by clamp-lift trucks of unit loads of fruit for ripening before processing, thus also providing more space for subsequent storage of canned fruit; and (4) Raising of floor-carrying capacities by reinforced concrete construction to allow for added weight of clamp and fork-lift trucks.

A number of changes were needed to increase capacity



and reduce costs in the newly-located receiving, sizing, and ripening operations. Of these, the major changes are: (1) Construction of truck bays for off-the-street unloading (bays are equipped with truck dock-clamps that permit easy unloading of road trucks by lift-trucks and, also, relieve the traffic congestion along Columbia St.); (2) development of rapid methods of road-truck unloading with clamp-lift trucks; (3) redesign involving double floor-chain to supply the box stack-dumper, thus increasing its capacity; (4) design and installation of a chain-hook box and lug conveyor system to eliminate the manual handling of lugs and, also, provide a constant flow of lugs and boxes; and (5) reduction in material handling labor costs by eliminating slow freight elevators and substituting floor-holes.

Various studies and tests of road-truck unloading determined approximate capital investment, equipment costs, time and labor required, and also adaptability to other uses. Tests indicated a road-truck bed sinks under the weight of a loaded lift-truck, and that a dock-board assumes too steep a slope for the lift truck to back off the truck onto the dock, unless some stabilizing device is used.

For AGA purposes, the Hydraulic Dock Clamp (made by Valley Evaporating Co.) was selected. It holds the rear-end of the truck bed at dock level in a vice-like grip, giving maximum stability and eliminating the dips and sways under the added load of a 4,000-lb. industrial lift truck and its 1,000 to 2,000-lb. load.

In operation, a road truck is backed into the bay against the clamp. At the rear of the truck, the driver actuates a pump lever that moves two vertical cylinders in position under the truck chassis. Next, he actuates an adjacent pump lever that raises the pistons of the two cylinders against the chassis, elevating the truck bed until the top of it is firmly secured against a projecting 6-in. steel dock-plate at floor level. One motor and two hydraulic pumps provide power for these two dock clamps.

Drivers are responsible for the proper loading of their trucks. They must leave a minimum 6-in.-wide space through the center, also lengthwise through a load, to provide room for entry of the clamp-arm of the lift truck.

A road truck is normally loaded with 288 lugs or boxes. There are 48 stacks, 6 boxes high, arranged in rows, 4 stacks across and 12 stacks lengthwise on the truck bed. As originally planned, a unit load for the clamp-lift truck was to consist of 2 rows of 3 stacks each. A load was to be picked directly off the road truck, transported to the double floor chain, and set down exactly over the 4 runs of chain.

Contrary to initial plans, which placed greatest emphasis on lift truck performance, it became more important to do some pioneering in the development of special lift-truck clamp-pad specifications. The Hyster Co. had developed a clamp-pad (incorporating a tube filled with fluid) for picking up a unit load of cement blocks or fire brick. This principle was incorporated in the model QN-20 fork-lift truck, with several design changes producing a clamp mechanism even better than expected.

Efficient Pick-Up

Original plans called for picking up 36 apple boxes, which would take up but 37 in. of the 43 in. long clamp-pads. The extra 6 in. was accounted by placing a 6 in. board near the mast of the truck so the load would ride 6 in. forward to the outer end of the pads. However, these clamp pads exert such uniform pressure that 2 rows of 4 stacks each (40 to 48 boxes) can be picked up at one time. This has now become standard practice under the pertinent conditions for apple boxes.

Dual front wheels were added to eliminate damage to wooden truck beds. These also provide drivers a feeling of greater stability when stacking unit loads two tiers high.

In 1952 it required 48 trips for two hand-truckers to unload 288 lugs in 18.5 min. Including minor delays, the total standard unloading time for the truck was 20 min.—or 40 man-minutes, not including the road-truck driver's contribution of time as a third hand-trucker.

The new method requires but 8 trips of the clamp-lift truck, with an average time of 6 min. expended by one man to unload a truck to the floor chain.

These ratios of 1 to 3 in unloading time and 1 to 6-plus in man-minutes are not, however, realized as a net saving. Here's the story: Trucks now are unloaded so rapidly that 60% of the unit-loads may be placed nearby in a temporary storage area. This forms a reservoir from which stacks are later moved to the floor chain, thus maintaining a constant flow of fruit to the stack-dumper. It also provides a supply for the night shift. Meanwhile, there are to be accounted new factors of time and delay, such

as for servicing the lift truck and waiting on the floor chain. And so, the average unloading time (including all allowances) is 15 man-minutes for the clamp-lift truck operation, and 10 min. for that part concerned with road-truck unloading.

To supplement AGA trucks, growers' trucks are hired to haul pears from cold storage to cannery. But in 1953, the 10-min. reduction in unloading time saved the cost of hiring one road truck (about $33 per day).

Road-truck drivers now rest instead of helping unload at the cannery. The one lift truck operator in 1953, actually worked about 6 hr. out of his 8-hr. day. This may be compared with 1952 when, with a smaller work load, there were two hand-clamp truck operators working steadily for 9 to 9½ hr. (see Table I).

Empty-Box Handling Costs

Overhead chain-hook conveyors have been adapted to several purposes in the cannery's complex materials handling net-work for empty apple boxes and orchard lugs. These transport—

1. All empty apple boxes, after pear dumping, to the pear-sizing operation.
2. Excess and broken orchard lugs from pear dumping to a box repair center.
3. Orchard lugs automatically to cannery pear-sizing box-fillers.

Flow of empty lugs or boxes begins at the stack-dumper on the 1st floor of this building. Empties drop from the dumper onto a short belt-conveyor leading to the 2nd floor. There, they are placed on the endless chain-hook conveyor, which carries them out of the building and elevates them, along the wall, to the 4th floor.

If apple boxes are being dumped, all are removed here and moved on roller conveyors, to storage, later to be used for shipping apples. As each box is removed, the transfer man replaces it with a lug. The lugs continue on to the 14 box-filling stations. Here, size-graded fruit is filled into them, and they move on a belt conveyor to the ripening storage in the cannery building.

When fruit in lugs is being dumped, the empty lugs makes the full circuit on this chain-hook conveyor—from 1st to 2nd to 4th floor and return to the 2nd floor, where they are filled with size-graded fruit.

Initial estimates indicated that pear-dumping operations and these conveying systems should be designed to handle 20 tons an hour to accommodate the increased 1957 tonnage. This is the equivalent of 1,000 boxes or lugs an hour, or about 17 a minute.

Subsequent studies indicated that machine delay time might be as high as 40%. So the system was finally designed with a capacity of 30-lugs/boxes a minute, about 8% above needed capacity.

Lugs are easily removed from chain-hooks by workers at the box filling stations. This reduces the work staff needed in this dumping and conveying system.

Labor savings are indicated in Table II. Not included is the related labor in the packing house, where method of operating has been changed but not amount of labor.

Pear Ripening, Handling

To operate effectively in 1953-'54, an interim system of pear-ripening storage was introduced, using both 2nd and 3rd floors of the reconstructed section of the cannery building. This required an extra operation—transporting ripened pears 115 ft. from floor-hole to peeler machines by clamp lift truck.

This extra operation will be eliminated in the final system, when unit loads (36 lugs each) will be lifted through the floor hole and set-off on short sections of gravity roller conveyors leading to the peeler machines. Lug-box setters will move lugs of pears directly in front of peeler machine operators.

Materials handling for pear ripening starts at the belt-conveyors leading from the size-graders (2nd floor of the Cascade packing house), where pears are loose packed in lugs. Filled lugs, in groups of 6 by pear sizes, move in procession on a conveyor belt spanning the street (at 3rd floor level) to the roof of the cannery building. At this point they make a 180-deg. turn onto another conveyor sloping down the inside wall of this building to the 2nd floor level of the reconstructed section. And as they reach the midpoint of this building they make another 180-deg. turn, then run parallel to the 3rd floor floor-hole and enter an FMC Stacker, approximately in the center of the building.

A floor chain from the stacker transports stacks of 6 lugs, properly assembled by pear sizes, through a size-segregation area. A hand-trucker then transports selected stacks a few feet to the accumulation section for each particular pear size. Unit loads of 36 lugs are assembled for clamp lift trucks. The distance traversed by conveyors from sizing to pear ripening is 485 ft. Previously it was 145 ft.

Unit loads of lugs are elevated by lift trucks from the 2nd floor through a specially constructed floor-hole to the 3rd floor level. This method of handling eliminates a slow freight elevator formerly used. Three Hyster YC-40 industrial clamp lift trucks are used for the present operation. Two of these operate on the 2nd floor level, elevating loads, and one on the 3rd floor for moving unit loads to temporary storage areas and also to the pear-peeling machines.

Each of these lift trucks also is equipped with special hydraulic clamp arms, side-shifter attachment, and oxycatalytic exhaust muffler. This truck is in the 4,000-lb. class and so provides greater stability in elevating unit loads, 14 ft. through the floor hole, permitting precise positioning of unit loads on gravity rolls.

Also, these trucks have fork-lift attachments to replace the clamp-arms so they may be used, after the pear canning season, for handling palletized canned goods, corrugated boxes, and similar materials up to 4,000 lb.

Original estimates, as well as the 1953 analysis of time and cost, indicate that the materials handling methods, during these interim years, will take less labor but cost about the same amount per ton until reconstruction of the remaining sections of the cannery has been completed.

A comparison of 1952 methods with 1953 and 1957 (Table III) shows results in proper perspective per ton of ripened pears. About 96% of the pears received for sizing are ripened for canning. Remaining 4% is accounted as culls.

Tentative and general plans for 1954-1957 project the following major changes in the cannery:

1. Reconstruction of remaining two-thirds of cannery building with concrete floors, providing fewer columns and greater storage space for additional pear ripening and canned goods storage.
2. Reconstruction of cook-room, with additional capacity as required.
3. An increase in steam boiler capacity.
4. Construction of additional canned-goods warehouse space.
5. Conversion of pear preparation lines for increased output at lowered labor cost per case.
6. Relocation of car unloading with development and installation of automatic handling system for empty cars.
7. Development of improved materials handling of canned pears going to cook-room.
8. Development of improved inter-plant materials han-

(*Turn to page 143*)

NEW EQUIPMENT & SUPPLIES

Compact, Floor-Model Condenser Is Easy to Install, Maintain

Ease of installation, economical operation, and minimized maintenance are advantages claimed for this floor-mounted direct-contact condenser. Limited headroom is no problem with this unit. It can be easily installed indoors near the process it serves.

No barometric leg is required. Motor pump pre-aligned and rigidly mounted on the condenser base handles water removal.

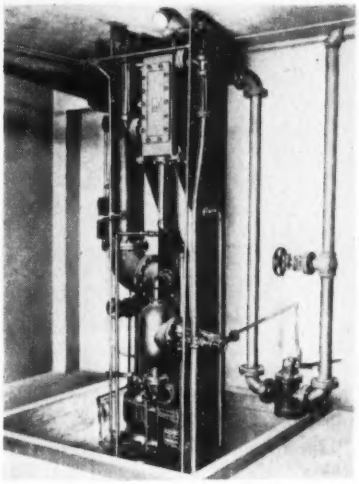
Further, maintenance is simplified since the unit is floor-mounted where the operator can easily get at it. Hazardous climbing for inspection and painting is eliminated.

Condenser is shipped completely assembled, ready to be bolted to the floor and hooked up to steam, water and electric lines. They can be furnished with single or multi-stage steam-jet ejectors to meet vacuum requirements of the application with the condensing water temperature available. Flexibility is possible in the arrangement of these ejectors because the two condensing chambers in each unit operate at different pressures.

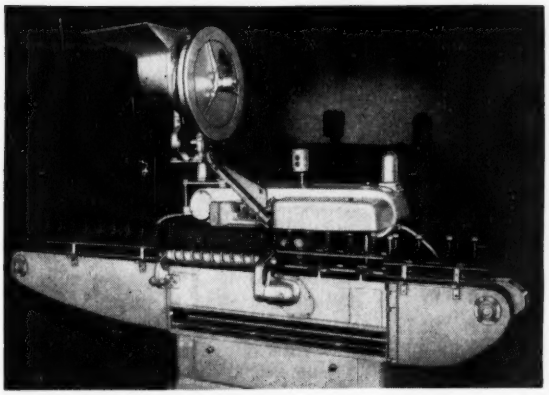
For example: Pressures as low as 50 microns can be produced with average water temperatures through use of three ejectors in series before the first condensing chamber, one between chambers and another after the second condenser. These combinations are available in a complete range of sizes and can be made of corrosion resistant materials when required.

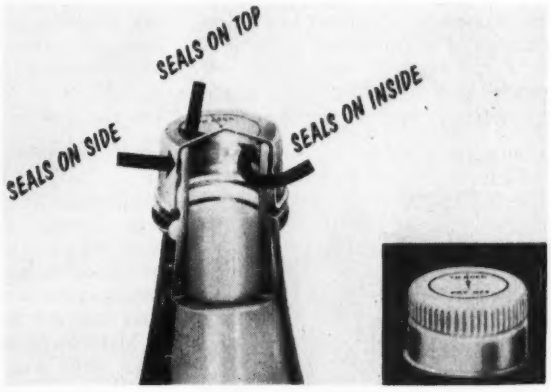
Units operate on a counter-current design wherein a thin, uniform curtain of condensing water is always maintained regardless of wide variation of water flow through the condenser. Unit's wide open passages will not clog. High-level water controls prevent flooding and permit condenser to handle sudden fluctuations in air-vapor loads and water flow.

Circle 99A on Reader Service Card



Condenser shown in illustration is in operation in a pork packing plant. Unit handles 250 lb. of air-vapor mixture per hr. including 10 lb. of non-condensibles, at .25 in. Hg. abs. The two condenser chambers serve as inter-condensers. — *Ingersoll-Rand, 11 Broadway, New York City 4.*





Improved Catsup-Bottle Caps Boost Protection

Blackneck in catsup bottles is reported minimized with use of this new vacuum cap. Called the Dualseal, it is applied to bottles under steam vacuum. Capping machinery will seal at any speeds at which catsup bottles can be filled in commercial operations.

Cap is a one-piece hermetic closure. Overall rubber sealing gasket (no paper liner is used or needed) is permanently molded under pressure, at high temperature, to inside surface of cap panel and down skirt to a point well below side sealing area.

Gasket is bonded so tightly to metal it is impossible to remove. Thus leakage between gasket and cap is positively eliminated in one of three areas where oxygen frequently enters.

Gasket is extremely dense, giving it high resistance against passage of air—eliminating a second common cause.

When cap is applied to bottle, sealing pressure tailor-molds pliable rubber gasket under and around bead, across top and into radius of bottle neck opening, actually effecting a triple seal.

This "Triseal" eliminates leakage between bottle finish and gasket, a third common cause of sealing failures and resultant black-neck in catsup.

Cap can be easily and quickly removed with back of a dull knife, bowl of a spoon, a coin or with any of many lift-type openers. Knurls at top of cap help further in making it easy to remove. Cap reseals tightly with a slight pressure. It snaps on and does not ooze off.—*Anchor Hocking Glass Corp., Lancaster, Ohio.*

Circle 99B on Reader Service Card

Numerous Improvements Highlight New Truck Line

Improvements in every part of the vehicle—engine, chassis and body—are reported on a new line of trucks. Among the more important advancements are the following features:

1. Three new engines, with increased hp. and economical performance.

2. Automatic transmissions optional through the one-ton (10,000 lb. GVW) model range.

3. Increased durability, with heavier axle shafts in the two-ton models, bigger clutches on light and heavy duty models and more rigid frames on all models. Optional heavy duty, three-speed transmissions available on light and medium duty models offer greater gear reduction, more rugged construction and a steering-column gearshift lever on one-ton models.

4. Improved comfort for driver.

5. Appearance upped with new, radiator grille and front-end design. One-piece curved windshield increases visibility and safety.

6. More space for payloads and easier loading. Body height of pickup, platform and stake models has been lowered through modified mountings. Unobstructed loading space has been lengthened on several models.

Most of truck models are easier to load. In pickup bodies, although sides are higher, over-the-side loading height is less. The rigid, grain-tight tail gate will support long loads when lowered.

Stake bodies are wider and longer. On the 161 in. heavy duty chassis, body of truck measures a full 12 ft. inside stakes. Loading heights on stake models are lower, rear corners have been rounded and stakes themselves are higher, extending 42 in. from body floor.

Major changes are reported in the new Thriftsmaster and Loadmaster truck engines. Increased compression ratio of 7.5 to 1 provides greater economy and 112 hp., resulting in higher top speed, faster acceleration and improved hill-climbing ability. Added durability and smoother operation result from full-pressure lubrication, lightweight aluminum pistons, insert-type connecting rod bearings, more rigid crankshaft and connecting rods and strengthened valve-operating mechanisms. Exhaust valve rotators, XCR valves and chrome top piston rings are standard on Loadmaster.

For heavy duty models the Jobmaster is offered as optional equipment. It provides greater power for acceleration and grade-climbing. Need for operation in low gear is reduced, producing longer engine life and economy. With displacement of 261 cu. in. and a compression ratio of 7.17 to 1, it has 135 hp. Cylinders are larger and a new high lift cam provides freer breathing. Exhaust valve rotators, XCR valves and chrome top piston rings are standard.

Automatic transmission is a new optional feature, available on light and medium duty models. It offers driving ease and important time saving, particularly in frequent-stop delivery work.—*Chevrolet Motor Div., General Motors Corp., Detroit 2.*

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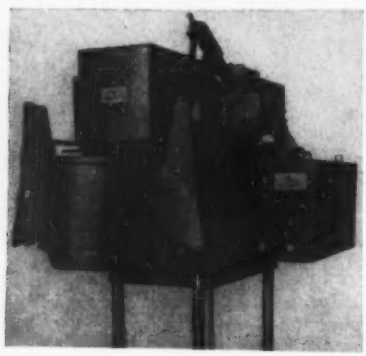

New Scales Speed Filling Operations

Fast and accurate weighing of granular, flake, pellet fibrous materials is reported with use of new filling scales available in two Models, 1000G, 1000N.

Both scales utilize a new feeding mechanism which, coupled with leverage system, enable high tonnage handling of materials weighing from 10 to 160 lb. per cu. ft. These units, maker states, can handle any material that does not flood.

Material feeder requires minimum head room and may be attached directly to a storage bin or surge hopper fed by gravity or by a conveyor system. Material is conveyed through feeder at right angles to gravity flow thereby minimizing effect of variation in head pressure on weighing accuracy. Adjustments are provided on feeder, remotely if desired, to compensate for differences in material density.

Any corrections can be made in few seconds. This feature permits scale to be used for wide variety of materials.

Model 1000G (illustrated) is a gross weighing scale used in direct filling of open mouth bags, drums or cartons. Feeder and bag holder require 20 in. headroom. Scale and feeder are 2 x 4 x 3 ft. high. Unit handles up to 8 bags per min. of any desired weight from 25 to 200 lb. within weight tolerances of 1 to 2 oz.

Unit is available with a wide choice of bagholders. Casters and locking screws may be furnished so that scale may be moved from one station to another.

Model 1000N scale is for net-weighing. Overall dimensions, with 3 cu. ft. hopper, are 2 x 4 x 6 ft. high. Unit handles up to 12 bags per min. of any desired weight from 25 to 200 lb. Tolerance is 1 to 2 oz. Unit pre-weighs, checkweighs and discharges loads according to desired frequencies.—*Thayer Scale and Engineering Corp., 492 E. Water St., Rockland, Mass.*

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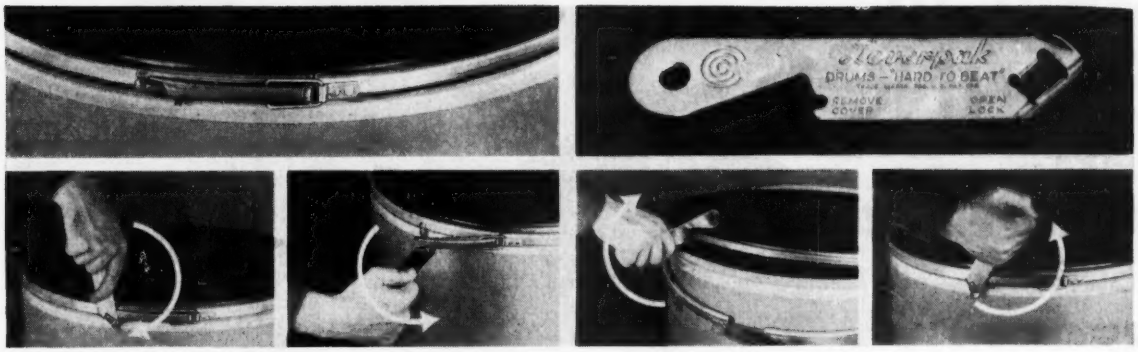
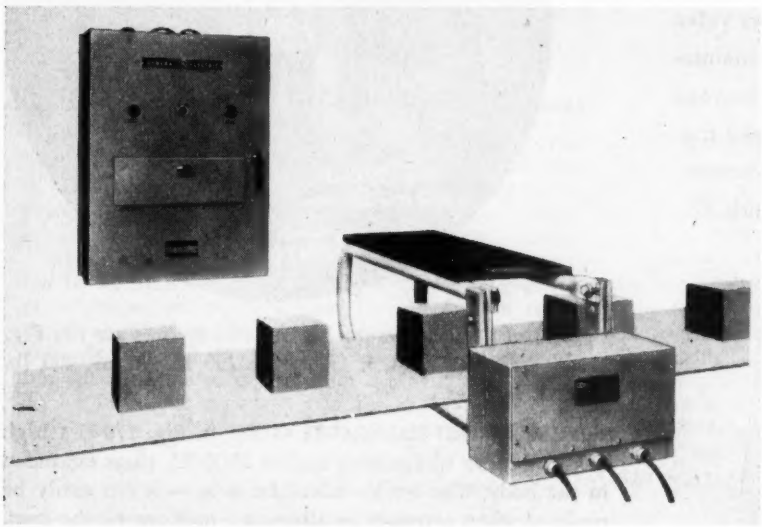


Hand Tool Speeds, Eases Opening, Closing of Fiber Drums

This opening and closing tool is offered to customers using Leverpak fiber drums to ship and store a wide range of dry bulk products.

Designed to make opening and closing of drum quick and easy, tool is supplied in quantity without charge to drum buyers and users. Combination photo shows (left) a close-up of level-lock, which seals a metal band around the lid and (top right) the opener. Bottom picture (left to right) demonstrate how to: Open the lock, flip the lever to disengage the metal band, lift the lid, and re-close the lever-lock. Tool can be used on any Leverpak from the 12-75 gal. sizes.—*Continental Can Co., Inc., N. Y. C.*



Detector Simply Installed on Belt Lines

This general-purpose metal detector can be installed around conveyor systems without cutting the belt. Unit can also be adapted to special applications.

Device can be used in processes involving the inspection of non-magnetic and non-conductive materials. Belt speeds can range from 90 to 500 ft. per min. In industrial food operations detector will discover metal particles in such products as cereals, candy bars, and many packaged food products.

Equipment consists of two main components: An electronic cabinet and an inspection coil system. Control cabinet contains electronic components and bridge circuits which are completely enclosed. Door is gasketed to give dust-tight and moisture-resistant operation. This door, as well as an internal access panel opening to where calibration and operation controls and meters are housed, can be locked to prevent tampering.

Controls and indicators for operation of equipment are mounted on outside. A green light indicates when power is applied. Red light is used as an alarm signal when metal passes through coil unit. Red light is operated by a relay having auxiliary contacts for other types of alarms, either audio or visual, or to actuate a control circuit. Resetting is done manually but provision has been made so a timing system and automatic reset can be employed.

Yellow light labelled "balance" indicates when automatic balance system is not operating or is outside its limits. Although balancing circuit covers a wide range, thus eliminating need for frequent balancing procedures during operation, it is necessary to have some indication if detector loses sensitivity. Yellow alarm is also relay-operated and has auxiliary contacts.

Coil unit consists of inspection coils and junction box containing necessary transformers and part of the balancing network.

Coils are -½-in. dia. aluminum tubes and are attached to heavy aluminum straps on junction box. They may be slipped over a conveyor type installation and then bolted to junction box without disturbing conveyor system whatever.

Two standard sizes are presently available:

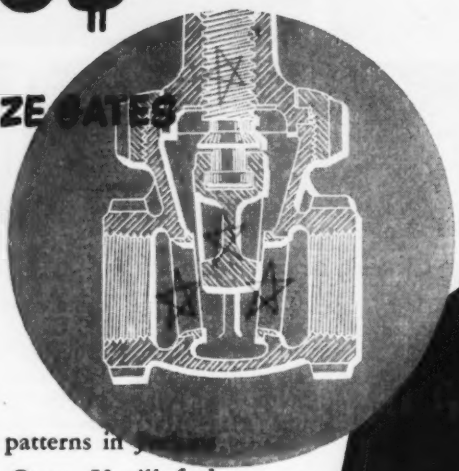
One rectangular, inside dimension 33 by 10 in.; other circular, with a 4 ft. dia.

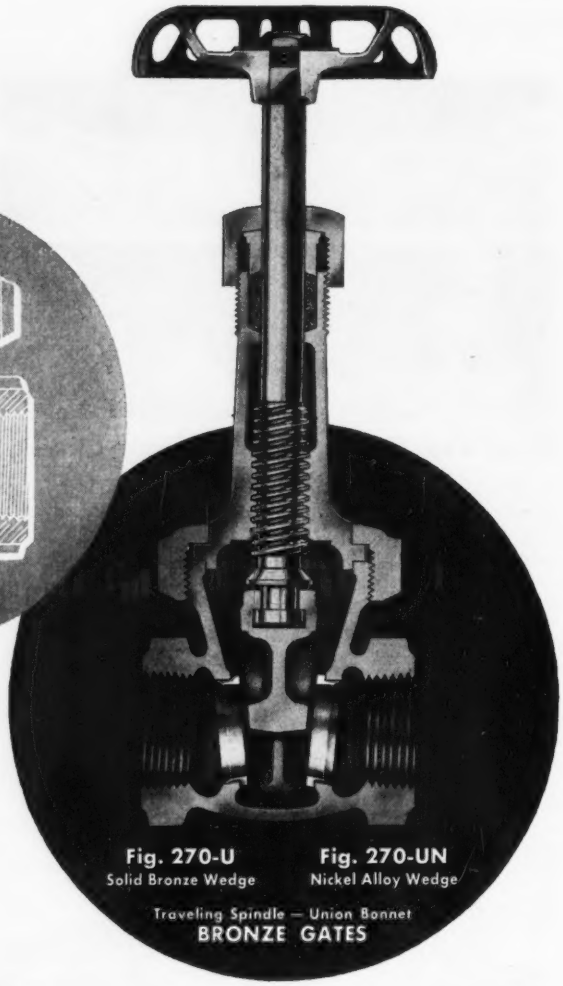
In operation, device detects metal by perceiving effect of metal particles on characteristics of an inductance bridge circuit. Coils which make up inspection unit are elements of this bridge circuit, and a metal particle coming into inspection aperture causes bridge to become unbalanced electrically. The output (or unbalance signal) of bridge is then amplified and used to operate an appropriate alarm or control.

Power requirements are 105/125v., 60 cycle, 150w.—*General Electric Co., Schenectady, N. Y.*

Circle 101A on Reader Service Card

Built-in $AVING$ make JENKINS BRONZE GATES your BEST BUY



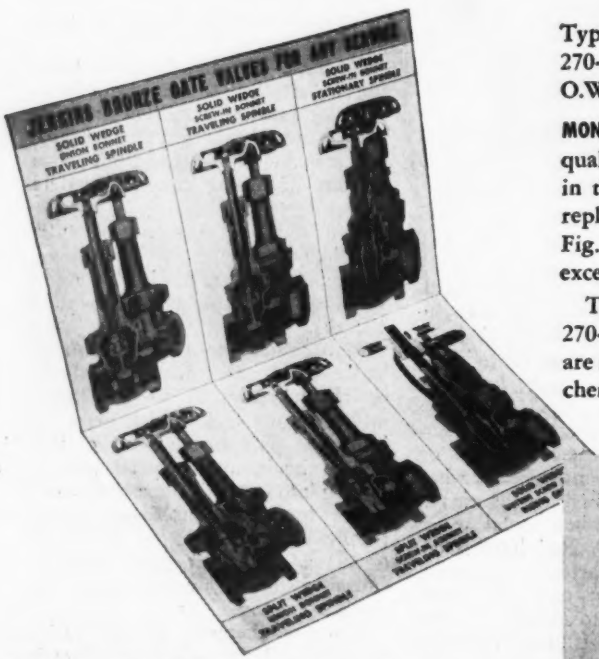


Look over any of the 35 patterns in [illegible] complete line of Bronze Gates. You'll find *savings* built into every valve. Jenkins valve specialists designed each one for easy maintenance and extra long wear. Try them on your toughest services and see why they take top-rating in any test for endurance and economy. Jenkins Bros., 100 Park Ave., New York 17.

Typical of Jenkins design for built-in savings are the Fig. 270-U and Fig. 270-UN Gates for 200 lb. Steam, 400 lb. O.W.G. services.

MONEL AND BRONZE SEATING COMBINATION In Fig. 270-U a high quality bronze wedge seats against MONEL rings expanded in the body. The wedge takes the wear — it can easily be replaced when necessary by slipping a new one on the stem. Fig. 270-UN, with a nickel alloy wedge, is recommended for exceptionally severe conditions of rapid wear and corrosion.

These and other features of rugged construction make Figs. 270-U and 270-UN first choice for economy where conditions are most destructive to valves, as in oil refineries, dye houses, chemical, food, and rubber plants.


JENKINS BRONZE GATE VALVES FOR ANY SERVICE
SOLID WEDGE UNION BONNET TRAVELING SPINDLE
SOLID WEDGE SCREW-IN BONNET TRAVELING SPINDLE
SOLID WEDGE SCREW-IN BONNET STATIONARY SPINDLE

Jenkins Bronze Gate folder shows the many types available — lists convincing reasons why they are your best buy for any service. Ask for Form 181-A.

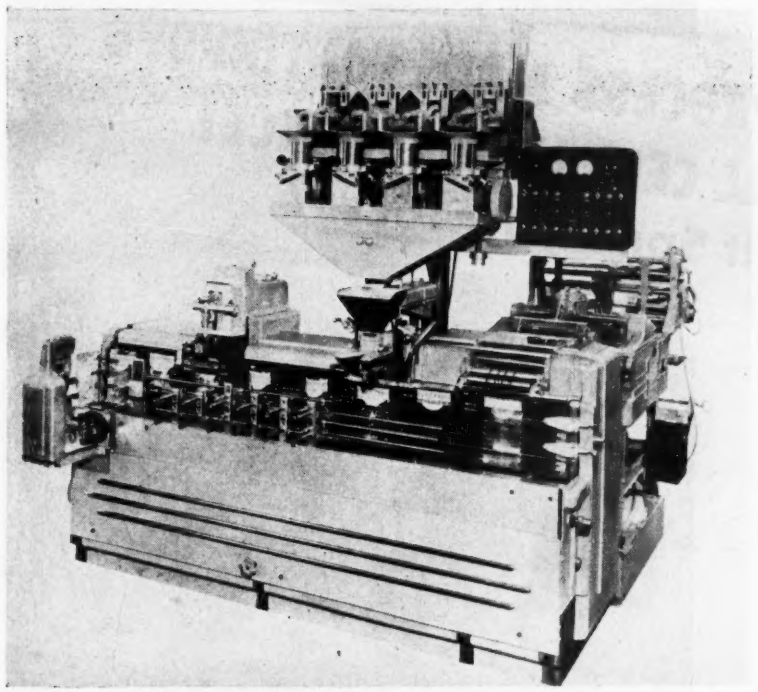
JENKINS VALVES

LOOK FOR THE DIAMOND MARK

SINCE 1864 TRADE JENKINS MARK

Jenkins Bros.

SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS



Efficient Packaging Unit Is Fully Automatic

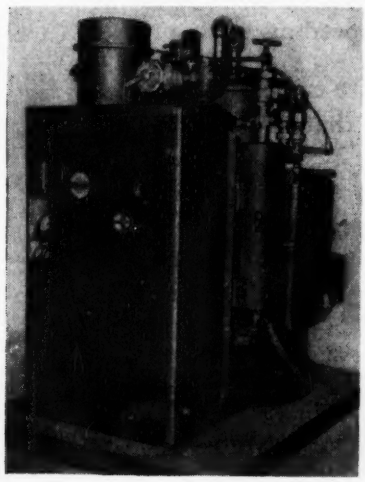
Product waste is prevented, labor reduced and operations speeded with use of new, fully automatic packaging machine for candy, nuts, rice, macaroni, beans, powder.

Named Simplex-O-Matic, machine can be set up with either net weight or volumetric measuring devices for waste-free filling operations. It automatically forms single or duplex bags from plain or printed roll stock up to 4 x 8 x 12 in., flat or gussett, then fills and seals them at rates up to 35 per min.

A "no-bag no-fill" safety feature prevents product waste during filling. An electric eye attachment for print registration or label positioning is available as extra equipment, as is an "over-under" checking device.

Interchangeable plates in controlled heat sealer unit allow production of either flat or gussetted bags, as desired. A few simple adjustments convert unit from one type of product to another.—*Simplex Packaging Machinery Corp., Food Machinery and Chemical Corp., San Jose, Calif.*

Circle 103A on Reader Service Card



Fuel Shift Fast, Easy On Steam Generator

By simply flipping one switch, this new steam generator can change from fuel-oil to natural gas fuel without interrupting steam output.

Engineers have incorporated fuel-oil spray nozzle right into metal body of gas burner. When fuel selection switch is flipped from natural gas to oil, the motorized gas valve closes and fuel-oil solenoid valve opens, releasing oil under pressure to spray nozzle. Fuel oil is always ready to be released to combustion chamber because it is continuously circulated through generator's hydraulic modulating controls. A constant spark and pilot light insure positive lighting.

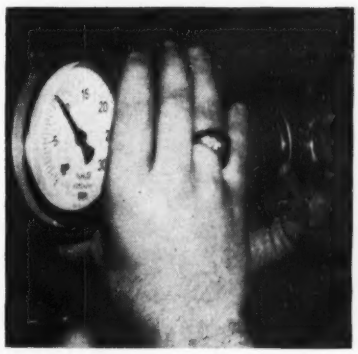
Generator develops full working steam pressure up to 300 lb. pressure, in less than 3 min. from cold water, and makes 1,500 to 5,000 lb. of steam per hr. Efficiency is stated to exceed 80 percent.

Once started, automatic controls take over, causing generator to turn on and off and modulate steam output to meet changing demand. Steam pressure may be changed from 10 to 300 lb. pressure by turning one control.

Separator removes excessive moisture and water treatment particulars from steam so that 99 percent dry, clean steam is directed through stop valve to line. Protective safety controls are: Steam temperature limit control; low water shut off; two safety valves; overload relays; electric eye and others, built into machines. Construction is in accordance with ASME, Hartford and Underwriters specifications.

Generator is a complete package which includes the 7½ hp. electric motor, blower, feed water pump, steam separator, steel coils, and all controls, in a trim cabinet. Each machine is operated and checked at factory before it is crated and shipped. Overall dimensions are: Width 50 in.; height, 80 in., length, 73 in.—*Vapor Heating Corp., 4501 W. 16th St, Chicago.*

Circle 103B on Reader Service Card

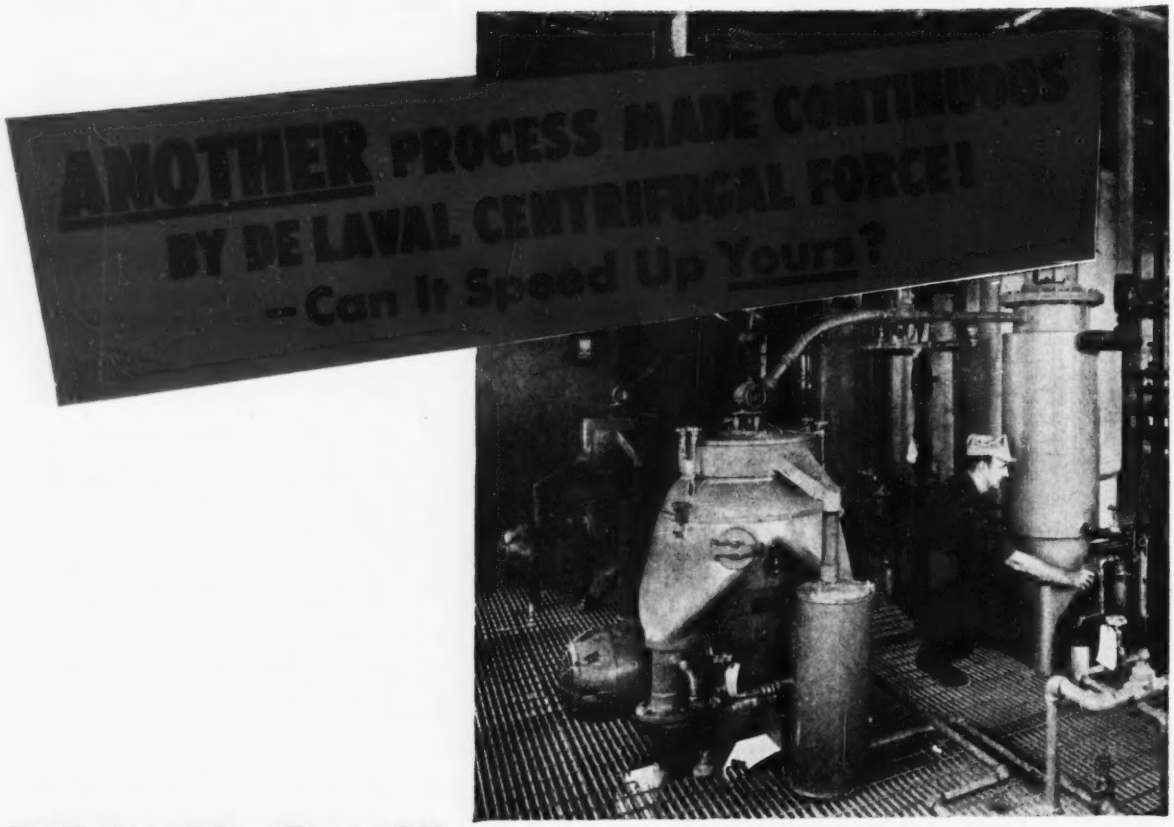


Portable Unit Measures Moisture Content

Surface moisture in powdered, granulated or fibrous material can be accurately measured with use of this portable instrument.

Called the Olivo Moisture Meter, it is simple and easy to operate. It can determine the surface moisture-content of material in less than two minutes.

Meter can be readily carried anywhere without difficulty and tests can



Refining Rice Bran Oil

The production of rice bran oil can be speeded up very effectively by using De Laval centrifugals at two points in the refining process. One De Laval machine, the Soapstock Separator, removes the soap and waxes from the oil. Another type of De Laval centrifuge separates out excess alkali and other impurities.

For many years De Laval machines have been used to refine vegetable oils. Rice bran oil separation is merely a logical extension of this experience. It is one more example of how a De Laval centrifuge can save time and money by speeding up a process.

Usually, centrifugal separations are quite easy; in some cases, De Laval machines will break emulsions that are too tight to break by other means.

● Why not tell us of *your* problem.

THE DE LAVAL SEPARATOR COMPANY Chicago POUGHKEEPSIE San Francisco

DE LAVAL FOR FASTER PROCESSING SYSTEMS

For more information, use coupon on page 175.

be speedily and conveniently made.

When properly calibrated, meter is accurate to .2 per cent of surface moisture as compared to standard air-dried surface moisture results. For example, a sample having an air-dried surface moisture of 10.0 percent would have a comparative "Olivo" surface moisture of from 9.8% to 10.2%.

To operate, pour a determined amount of material to be tested into meter, add the provided vial of calcium carbide, shake to break vial and mix its contents with material being tested, then read moisture content on indicator. After reading is made, wipe out contents and meter is ready to make another test.—*Heyl & Patterson Inc., 55 Fort Pitt Blvd., Pittsburgh 22, Pa.*

Circle 103C on Reader Service Card

Electronically Controlled Valves Speed Operations

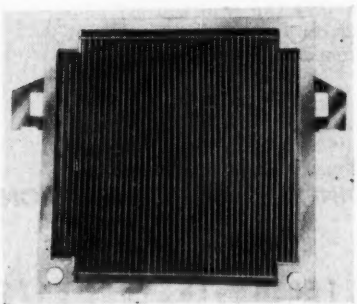
Increased operating efficiency and reduced time is envisioned by engineers with use of electronically controlled valves operated from a central location by remote control. Valves so operated also can be installed in locations not readily accessible or termed hazardous areas.

Valves (see above), constructed from special specifications, were used at a recent exposition in Tulsa, Okla., in a joint demonstration by valve maker and electronic equipment manufacturer.

Electronically controlled valve was located in booth at Exposition grounds. Controls which operated valve were set up in lobby of Mayo Hotel in downtown Tulsa, and the valve mechanism was activated by microwave.

Television cameras and receivers at hotel and at exposition grounds enabled observers at hotel to see valve working at exposition and observers at grounds to see operator push control buttons at hotel.—*The Lunkenheimer Co., and Radio Corp. of America. Cincinnati, Ohio, and Camden, N. J., respectively.*

Circle 105A on Reader Service Card



Lightweight Plate Eases, Expedites Filter Jobs

Ease in handling, cleaning and maintenance in filter press operations is reported with use of this new plate. Called "Multi-Plate", it has a corrugated sheet metal drainage field of stainless steel (or other metal) supported and welded in a rugged channel frame or solid rim. Beam loading and compression tests show plate's strength to be many times filter's maximum fluid pressure. Tests on a 24 in. sq. plate at a hydrostatic pressure of 120 psi. showed no deformation. Designs will also be available to withstand operating pressures to 600 psi.

Light weight of plates eases handling. Insertion and removal from press, especially in larger sizes, is fast and requires little labor.

Cleaning, washing, steaming or sterilizing is simple, quick and easy. Smooth surface preempts carrying over and imparting of foreign odors or discoloration when changing from filtration of one product to another.

Plate may be used in any conventional filter presses of the corner (eyed) or side (external eye) feed designs, washing or non-washing types, open or closed discharge. It is also available in recessed plate design. Corrugated filter area adequately supports textile or metallic filter cloth, without sagging or injury. Where metal cloth is used the binding rim may be gasketed.—*Multi-Metal Wire Co., Inc., 1350 Garrison Ave., New York City 59.*

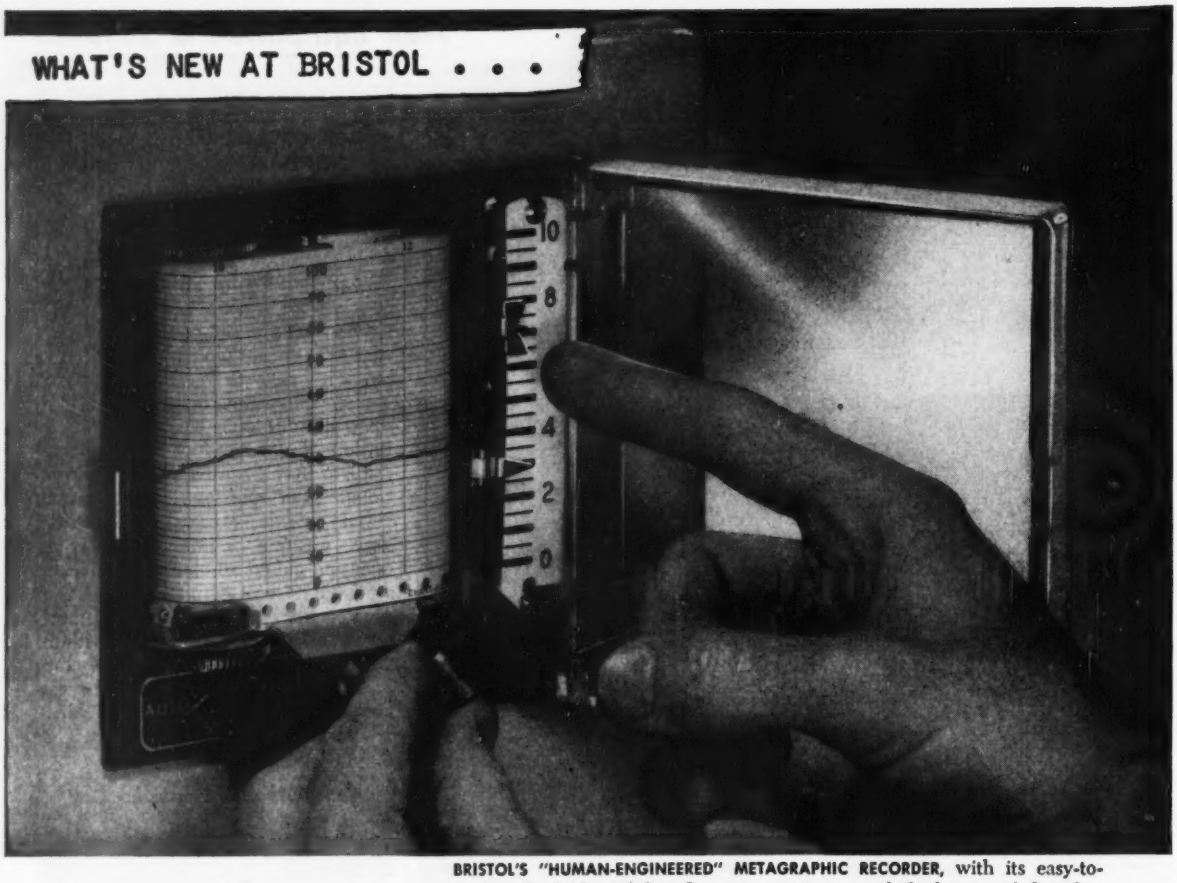
Circle 105B on Reader Service Card

Clamp Eliminates Pallets In Carton Handling

Palletless handling of bottle or packaged goods, shipped in fibreboard cartons, is now feasible. A new carton clamp for lift trucks does the trick.

Primarily designed for the brewing industry, this clamp provides increased efficiency in warehousing as well as in the loading and unloading of shipments. Clamp is capable of handling 49 standard cases of bottles, a stack seven rows high containing seven cases per row.

WHAT'S NEW AT BRISTOL . . .



BRISTOL'S "HUMAN-ENGINEERED" METAGRAPHIC RECORDER, with its easy-to-read scale, high-visibility fluorescent pointers and shadow-proof door has earned the distinction of being the "biggest little instrument in the business."

Instrument men call Bristol's METAGRAPHIC Recorder

"... the biggest little instrument"

Sounds contradictory, but it's true. Take a look at one of our new METAGRAPHICS mounted on a panel board alongside of other instruments. The Bristol unit stands out – seems bigger than the rest – although chances are it's actually smaller (5" x 5½"). The answer is that the Bristol instruments have been "human-engineered", making them easy to read, and clearly visible at greater distances.

The air-operated METAGRAPHIC, which records pressure, temperature, vacuum, flow, differential pressure, and liquid level, offers these big advantages:

SIMPLICITY . . . fewer moving parts, fewer adjustments, and less service required. Range changes can be made in seconds. True plug-in service.

CONTINUOUS VALVE-POSITION INDICATION . . . on same instrument scale as set-point scale, gives continuous data on control valve position—makes "bumpless" transfer possible simply by matching pointer positions – no need to read actual scale values – minimizes reading errors – speeds operations.

CONTINUOUS OPERATION . . . complete unit can be retracted for inking pen, and for set-point and zero adjustment without disturbing record or control.

Get the whole story on the "human-engineered" METAGRAPHICS – how they can help you get more accurate measurements, faster and easier. Write us today. The Bristol Company, 115 Bristol Road, Waterbury 20, Conn.

BRISTOL

POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

6.4.4R

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

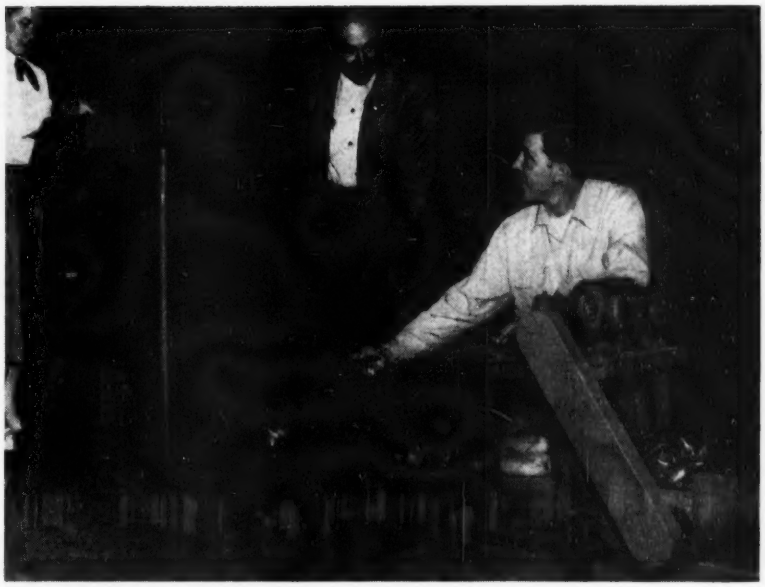
For more information, use coupon on page 175.

Lifting surface of clamp is faced with large area rubber pads which grip load securely as uniform side pressure is hydraulically employed. Clamp is so designed that it provides adequate pressure without crushing or breakage.

Another important feature of clamp is that it makes handling of divided loads possible thus facilitating order filling in the warehouse.

Clamp can be easily attached to maker's gasoline or electric fork trucks and can be used with a sideshifter which makes it possible to position loads accurately without "jockeying" fork truck—*Yale & Towne Manufacturing Co., Philadelphia.*

Circle 105C on Reader Service Card



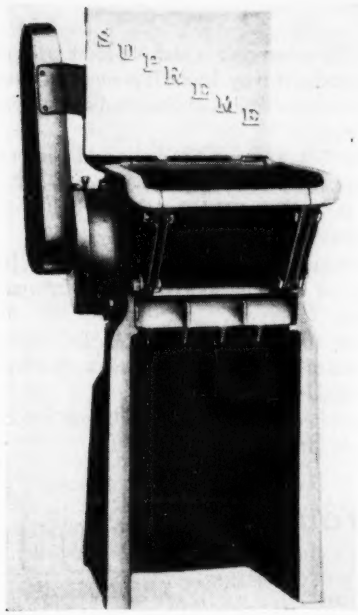
Automatic Unit Accelerates Prepackaging

This light-weight pre-packaging machine bags various-sized commodities, wet and dry, weighed or bulk produce, including fruits, vegetables, candies, and bakery goods. Up to 45 bags a minute are filled automatically by the unit, with one operator feeding items into hopper, which operates by gravity.

Where automatic weighing machinery is employed in the production line, the pre-packager can be operated without an attendant. It is adaptable to all types of bags, including cellophane and polyethylene. A cartridge on the unit holds from 500 to 1,000 empty bags. Filled bags emerging from the machine are not closed.

Pre-packager weighs 280 lb., is 42 in. high, 32 in. long, and 23 in. wide. It is powered by a ½ hp. 110-220v. motor.—*Maurer-Walldow, Inc., 513 S. Main St., Salinas, Calif.*

Circle 107B on Reader Service Card

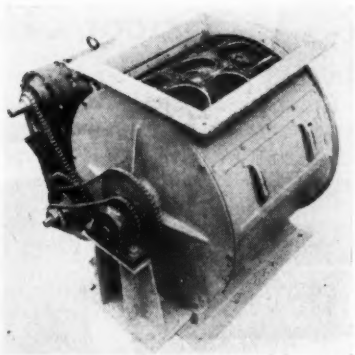


Crusher Speedily Handles Hard or Soft Materials

Candy, frozen eggs, liver extract, filter cake can be readily handled by this crushing machine. Unit accepts hard or soft materials and is reported not affected by gummy substances. It can be furnished in stainless steel or tinned construction for food products.

Machine will accept any size input up to 13 x 16 in. in cross section by any length and reduce it in one operation to ½ in. size or less. Size is adjustable up to 3 in. Capacity is up to 15 ton per hr. Screening and conveying attachments are available. Crushers are available from stock. A free test run service is available.—*Franklin P. Miller & Son, Inc., 36 Meadow St., East Orange, N. J.*

Circle 107A on Reader Service Card



Feeds Bulk Materials In Uniform Flow

Sticky and/or flushy materials are successfully handled by this new rotary feeder. Class of materials include non-corrosive chemicals, feeds, grains, and other food products.

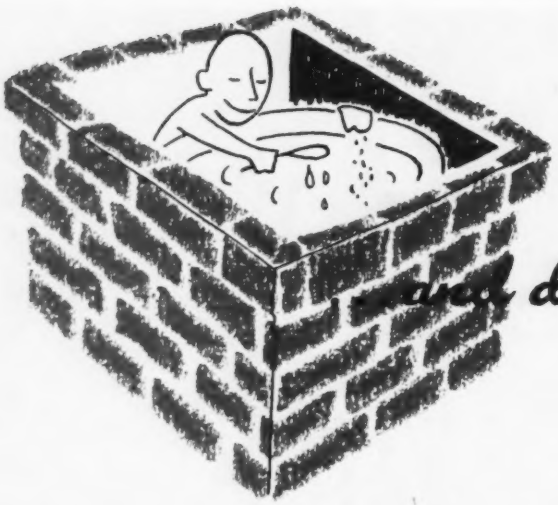
Key design feature is a rubber pocket that increases and decreases in volume when charging and discharging. There are 36 pockets; each one, 5 in. in dia. Pockets tend to suck in product with a minimum displacement of air, and urge material out at discharge. Machine thus acts like a positive displacement pump.

Outputs range from 300 to 1,000 cfh. Feeder delivers a uniform flow, runs silently, is self-cleaning and completely self-contained. Design is rugged, and there are no delicate parts to get out of adjustment.

In operation, feeder is attached to bottom of a bin. Feed drops into machine and fills pockets located on periphery of feeder's drum. Material is carried around and out bottom of machine and delivered to processing equipment. Openings on top and bottom are 15x19 in.

Operating like cylinders in a radial airplane engine, rubber pockets increase in volume when passing under inlet, and decrease when passing discharge opening. Maximum volume is normally 90 deg. past inlet, and minimum volume is normally 90 deg. past discharge.

Here's how they operate. A con-



A DASH OF THIS, A PINCH OF THAT . . . and down goes Waldin Smugg

WALDIN SMUGG – who makes a product called foodle – uses the dash-of-this-and-pinch-of-that system of putting in the ingredients. Says Smugg, that's the way foodle has *always* been made. So he sits behind this brick wall of complacency, reading all the foodle articles in the "trade papers."

Scene changes: In the offices of Smugg's arch-competitor, Foodle Inc., the plant manager is reading FOOD ENGINEERING. He leaps to his feet. "Hey, here's an article on how a chowdy plant in Detroit meters all 65 of its ingredients into the mixer automatically! Would that set-up work on foodle?"

He tries it. It works. *Up* goes quality, *down* goes cost. And—if Smugg's competitors do this often enough—*down, too, goes Waldin Smugg.*

Walled in by his narrow viewpoint, Smugg can't see that a tidal wave of *engineering* is making food *processes* alike, though the *products* may differ. It is sweeping identical equipment and materials from one kind of food plant to another. *(See example*.)*

By reading FOOD ENGINEERING, Smugg could peek over his wall into *every kind* of food plant for cost-cutting, quality-building ideas. For FE helps each kind of food plant use the experience of the others.

And FOOD ENGINEERING reaches *outside* the food industry for hot new ideas in electronics, maintenance, materials handling, labor relations – and many other cost-cutting, quality-building subjects. For FE uses the unmatched facilities of McGraw-Hill . . . industry's *Headquarters for Business Information.*

We think we can *help* Waldin Smugg. If you see him, tell him. If you see him in your mirror . . .

LOOK OVER **YOUR** WALL WITH **FOOD ENGINEERING**

*Speaking of metering, the graph at right shows how the use of automatic feeding and metering has spread from one type of food plant to another in the past 25 years. The food *products* differ, yes—but identical equipment is being used in many of these processes. FOOD ENGINEERING helps you follow, and participate in, this "idea exchange."

Subscription rates on page 7

necting rod runs from base of pocket to a rotating shaft that is offset ¾ in. from drum axis. Shaft rotates at same speed as drum. As drum turns, rods push and pull on pocket, changing its volume accordingly.

Discharge, therefore, is positive and requires no scrapers, rolling balls or other cleaning means. Rubber for pockets is specially compounded.

To assure uniform output, pockets are spaced on three staggered rows. Drum is hollow, made of mild steel and runs on heavy-duty bronze bearings.

To prevent flushing of product, clearance between drum and outer cylindrical frame is small—about 0.030 in.

Outer frame is 2 ft. in dia., 20-in. long. An access plate is provided for easy inspection of drum and pockets. A sprocket drive turns drum and shaft from outside framework. A gearhead motor with a maximum speed of 60 rpm. runs the drive.—*Richardson Scale Co., Van Houten Ave., Clifton, N. J.*

Circle 107C on Reader Service Card

New Electronic Instrument Controls Sugar "Seeding"

In the refining of sugar a newly developed electronic recording instrument—a single-pen, circular-chart recorder—automatically and continuously provides accurate measurement of supersaturation to permit control of the seeding process.

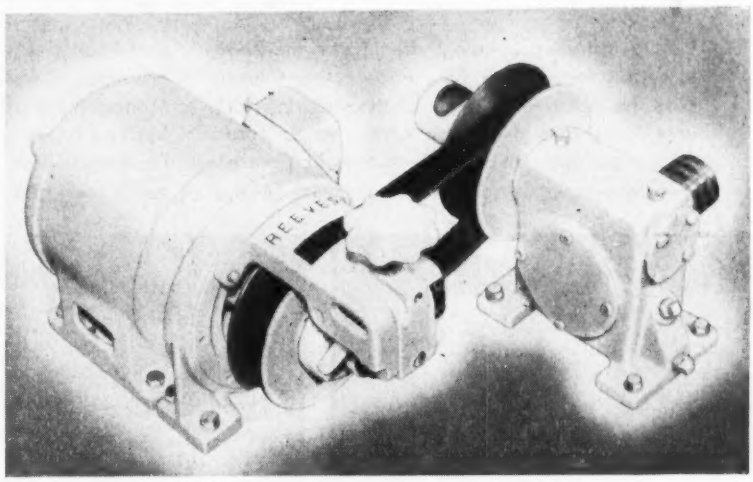
Field tests have shown that sugar produced under these controlled conditions is more uniform, of higher quality, and requires less reprocessing. New unit is the first which automatically and continuously computes supersaturation, a critical step in the sugar process.

Developed after some five years of field research, instrument accurately measures degree of supersaturation by determining boiling temperature of sugar solution, absolute pressure of gases and vapors under which solution is boiling, and purity of solution. Supersaturation, maker's engineers explain, is that point at which the highly concentrated syrup, after boiling, contains more sugar in solution than could be dissolved by water at given temperature. In sugar making, it is at this point that crystallization of sugar is started by introducing crystals (seeding).

To obtain maximum production and a uniformly grained sugar, degree of supersaturation must be precisely measured to determine when to "seed" pan with crystals. If supersaturation is allowed to go too high, additional unwanted crystals are formed and must later be dissolved—a process that also dissolves some of desired crystals.

Conventional methods of determining degree of supersaturation ranged from reliance on skill of old-time "sugar boilers," to use of several instruments necessitating time-consuming computations. Occasionally crystallization proceeded so rapidly that whole mass solidified and had to be chopped apart and remelted.—*Minneapolis-Honeywell Regulator Co., Industrial Div., 4502 Wayne Ave., Philadelphia, 24.*

Circle 109A on Reader Service Card



Flexibility Marks New Speed Drive Assembly

Practically any gear reducer, either worm or helical, can be driven at recommended speeds by the Flexi-Speed drive. New variable speed disk assembly does the trick. Unit, because of its lower speeds, also is more adaptable to many applications without reducer.

Latest model of drive may be mounted in almost any position around the driven equipment, may drive in any direction, and can deliver any desired speed within a ratio of 6:1. Drive also offers maximum mounting flexibility. Driven shaft may be located anywhere around motor shaft, and control handwheel may be located parallel to or in any of eight positions perpendicular to motor shaft. Six different length belts offer a wide choice of shaft center distances. This flexibility makes drive a desirable built-in machine unit.

Units presently are available in ½, ¾ and 1 hp capacities.—*Reeves Pulley Co., Columbus, Ind.*

Circle 109B on Reader Service Card

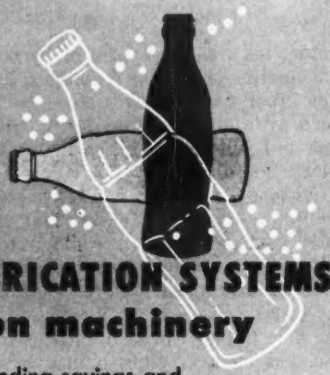
Laboratory Clarifier Is Compact, Versatile

Compactness and versatility of this Westfalia clarifier make the unit well suited for installation on a laboratory work bench in research, pilot plant and quality control operations.

Centrifuge can be used for clarification, mixing and emulsifying, solvent extraction, separation, and concentration of solids. Unit is 32 in. high, weighs 163 lb. Capacity ranges from 12 to 140 gpm. Units are distributed by—*Cherry-Burrell Corp., 427 Randolph St., Chicago 6.*

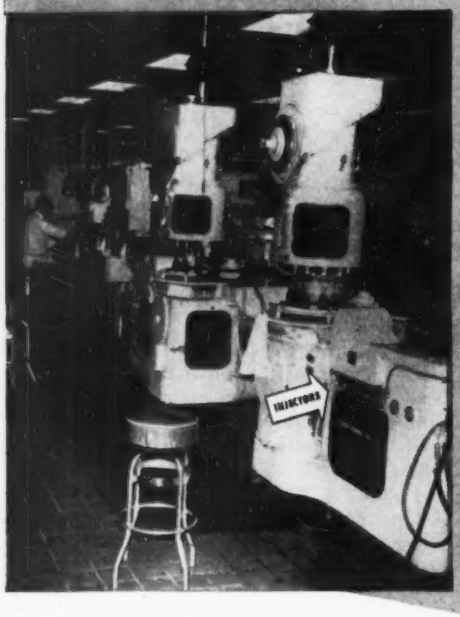
Circle 109C on Reader Service Card

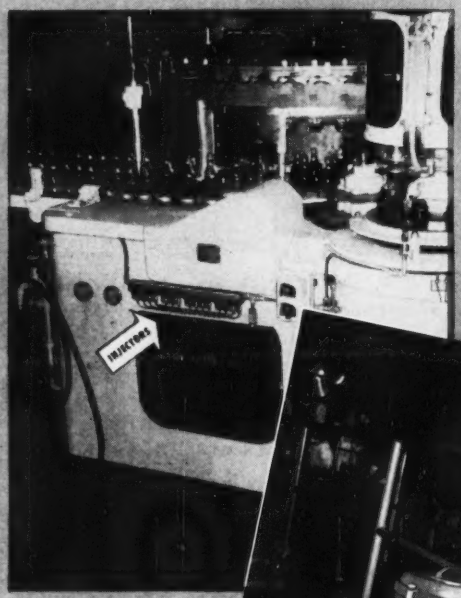
a Midwestern Coca-Cola Bottling Company Stops Bearing Failure, Bottle Breakage and Jamming



with Lincoln CENTRALIZED LUBRICATION SYSTEMS on all production machinery

Before installing Lincoln Systems, two men had to report for work an hour early to hand lubricate the machines. In spite of this, bearing failures, jams and breakage continued to occur. Trial installation of a Lincoln Automatic Centralized System was made on a single Case Feeder and Packer. Outstanding savings and advantages were so quickly apparent that Management approved installation of Lincoln Systems on all Capping and Filling Machines, Loading Tables, Uncasers, Conveyors, Washer Head Ends and Reeves Drives.





Two views of SL-3 injector batteries serving bearings on Bottle Filler and Cappers. Lubricant is supplied by Model 1808 Portable Bucket Pumps.

Closeup of Model 1825 Portable Bucket Pump on a case conveyor.

CONVERT PREVENTIVE MAINTENANCE TO PRODUCTIVE MAINTENANCE and you will save many hours that are now wasted on slow, haphazard, unsafe, old-fashioned methods of lubrication. Find out how you can get the cost-saving benefits of Lincoln Centralized Lubricant Application Systems. Write for your free copy of Catalog 80. It gives you facts on the complete line of Lincoln Lubricating Equipment.

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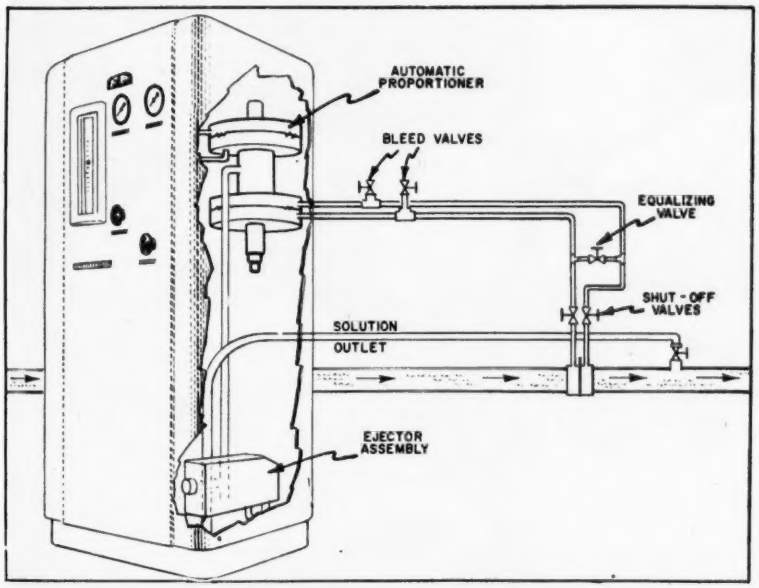
LINCOLN ENGINEERING COMPANY • 5781 Natural Bridge Avenue, St. Louis 20, Missouri

For more information, use coupon on page 175.



Chlorinator Component Provides Automatic Proportioning

With addition of a recently developed component to a chlorinator, the equipment will automatically feed chlorine to water and sewage lines in a direct and preset ratio regardless of changes in the main flow.

Unit is operated by differential pressure coming directly from an orifice plate. Once initial setting for a desired proportion of chlorine is made manually on rate valve, the automatic proportioner takes over.

Automatic proportioning component replaces differential pressure regulator which is used in manually controlled chlorinators. New component, connected by both high and low pressure taps at an orifice in the main flow line, extracts differential pressure which is then converted to a force by means of a diaphragm. This variable force changes loading of chlorine gas differential pressure regulator within the proportioning unit. Pressure drop across chlorine rate valve changes chlorine flow in direct proportion to flow of water in main.

Two proportioner models are available for standard and high capacity chlorinators. They are available in two standard differential ranges: 0-50 in. and 0-100 in. water column. Resistance to corrosion by moist or dry chlorine gas and to chlorine solution is assured by such construction materials as tantalum, Hastelloy "C", Uscolite, Teflon, Kel-F, Tygon and glass.—*Fischer & Porter Co., Hatboro, Pa.*

Circle 111A on Reader Service Card

Plastic Trays Are Strong, Light, Easy to Handle

Savings in labor, time and space in materials handling are reported with use of these new trays. Molded of polyester resins and Fiberglass, trays minimize product contamination and distortion.

Strong and lightweight trays are easy to handle. Trays have a flexural strength of 30,000 psi. and an impact resistance of more than 15 ft.-lb. Smooth working surface withstands daily loading, unloading, scrubbing, dehydrating, freezing and rough handling with little sign of wear.

Trays are stable over a temperature range from minus 60 to plus 300 deg. F. They are stated not to dent, warp or rot. Resistance of resins to acids, dilute alkalies and most other chemicals prevents harmful reactions between tray and contents. Trays can be scrubbed vigorously and repeatedly to prevent contamination of contents.

Here's how trays are now being used in a large bakery. Wrapping machine feeds 10 or more loaves of bread onto one of these trays in a single horizontal layer. This arrangement prevents distortion of warm bread by its own weight which often occurs when it is stacked on end. A gravity conveyor or standard cooling racks carry trays to loading dock. Bread is handled only once—from tray to store counter—and remains uncrumpled and undistorted. Empty trays nestle closely and lock together in high stacks that take little space in truck and bakery.—*Molded Fiberglass Tray Co., Linesville, Pa.*

Circle 111B on Reader Service Card

New Fractional Motors Have Smaller Frames

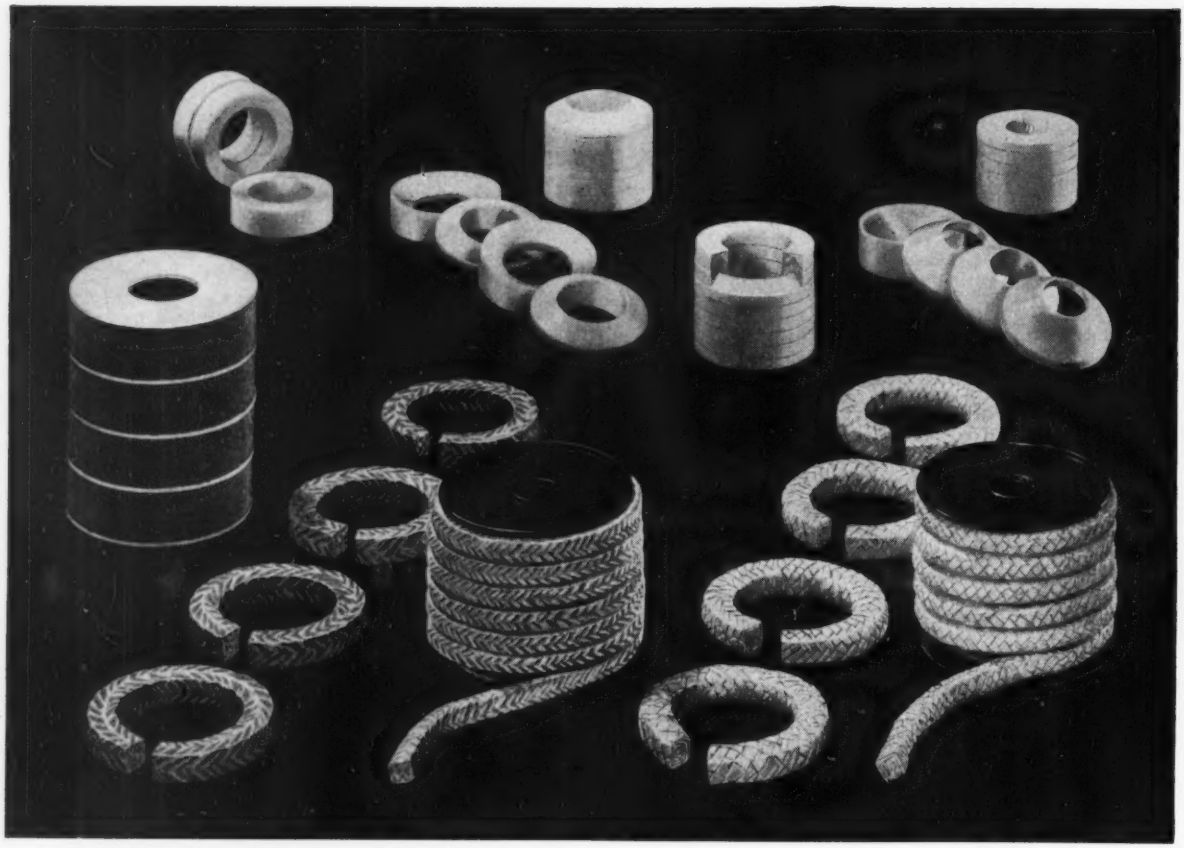
These new fractional horsepower motors are now offered in the rerated design.

Known as Form "F", new motors permit more horsepower in smaller frames with the same standards of performance and dependability of maker's line. Motors are available as: Type SP, split phase, single phase induction motors for general purpose applications where the load is easy to start and easy to pull up to speed; type CS, capacitor start single phase

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—page 175. Then sign at the bottom and mail.

For your convenience, too, items in this department are listed and keyed in the Reader Service Section.



Why R/M Teflon* Packings are so ideal for sealing food processing equipment

Consider first the virtues of "TEFLON": it is non-adhesive and non-contaminating. It shows no reaction against any chemicals which might be used in food processing. It is unaffected by any known industrial acids and caustics; it has no known solvent; its water absorption is zero.

R/M No. 840-W, lower left in the photo above, is an excellent example of the quality of the line. This packing, designed for valve stems, is made of braided asbestos yarns which have been impregnated with "TEFLON." The asbestos in the packing cuts the cost of pure "TEFLON," compensates for thermal expansion, and resists materials handled.

No matter what you are packing—pumps, valves, retorts, hydraulic presses, homogenizers, or what have you—R/M can supply you with the proper packing for the job. The complete R/M "TEFLON" products line includes rods, sheets, tubes, tape, packings, gaskets, rings and irregular shapes. For complete information, see your R/M distributor.

**Du Pont's trade-mark for its tetrafluoroethylene resin*

R/M MAKES A COMPLETE LINE OF PACKINGS AND GASKETS—AVAILABLE FROM YOUR AUTHORIZED R/M DISTRIBUTOR

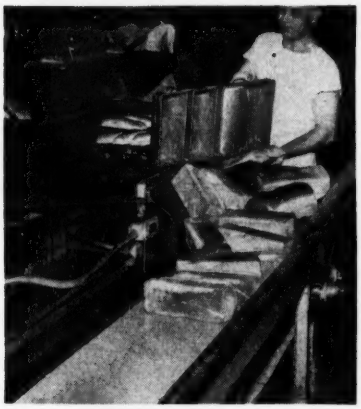
R/M PACKINGS
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, MANHEIM, PA.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville Ind.; Peterborough, Ontario, Canada.

RAYBESTOS-MANHATTAN, INC., Packings • Asbestos Textiles • Industrial Rubber, Engineered Plastic, and Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Bowling Balls

induction motors for hard to start applications such as pumps, compressors, machines starting loaded, and type SC, squirrel cage polyphase (3 or 2 phase) induction motors for all general purpose applications.—*Century Electric Co., St. Louis.*

Circle 111C on Reader Service Card



Easy-To-Clean Belts Resist Fats, Oils

High resistance to moisture, fats or cooking oils in the handling of foods is claimed for Koroseal lightweight conveyor belts.

Easy to clean, new belts are reported non-toxic and impart no odor of taste to food products. Belts have a smooth, non-porous surface that resists flaking or checking and eliminates danger of contamination of materials handled.

Included in new line are "Highseal" and "Kleenseal" belts whose tested "eye-rest" green color is said to increase inspection efficiency by reducing glare and eye strain.

Tan belts, 2 and 3 ply construction, are recommended for handling such materials as nuts, meats, greasy pans and bakery products conveyed at temperatures up to 150 deg. F. A single ply, white belt is designed primarily for use on cooling tunnel, enrobing, rider or inspection conveyor installations.

"Highseal" belts are said to qualify for service on 85 percent of all food installations. Belt resists moisture, food acids, most greases, fats and alkalies and will operate at temperatures up to 212 deg. F. "Kleenseal" is designed for low cost handling of fruits, vegetables and for service in canning, bottling plants and other light conveyor installations. It has good flexibility at low temperatures.—*B. F. Goodrich Co., Akron, Ohio.*

Circle 113A on Reader Service Card

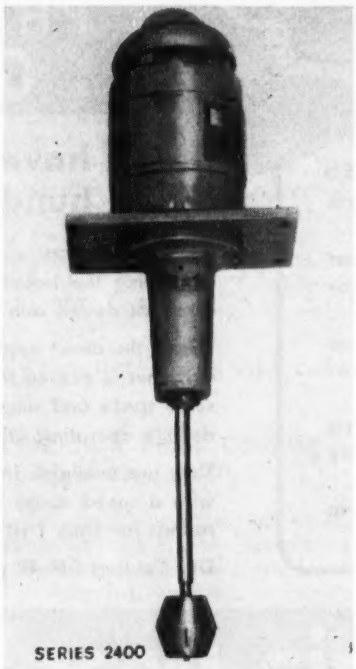
Indicator-Controller Unit For Two Temperatures

Of interest to operators whose process involves two temperatures is a recently developed instrument which indicates and controls both.

Instrument, a dual indicating controller, is available with a wet and dry bulb system for humidity as well as vapor gas or mercury-filled thermal systems. Dual indicator has two pointers and the measuring system components and set-point indices are color-coded to their respective pointers.

Among applications expected for indicator is in control of temperature and relative humidity of bread proofing and fermentation rooms. Others will be found wherever a single instrument is suitable for checking two temperatures and where indicating controllers are preferred to recorders. In meat packing, for example, dual instrument can be used to control temperatures of two adjacent ham-boiling tanks.—*Minneapolis-Honeywell Regulator Co. Industrial Div. Wayne & Windrim Ave. Philadelphia 44.*

Circle 113B on Reader Service Card



Maintenance Minimized On Mixer-Unit Drives

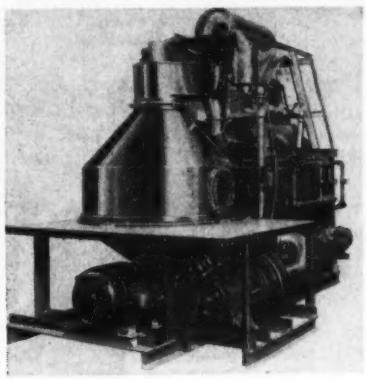
Flexible motor couplings, sealed for life bearings, sturdily welded (or cast) support frames are maintenance-free construction features reported for two new compact Dispersator drive units.

Labeled the Series 2400, for beam or channel mounting with open tanks, and the Series 3200, for flange mounting-sealed system operation, these units are designed to operate in the 30 to 300 gal. batch range.

Driven shaft in former unit is readily demountable by loosening chuck. The 3200 shaft is fixed, since alignment at a mechanical seal is often required.

These particular units will be of specific interest in the following ranges: 250 cps., 100 to 600 gal; 1,000 cps., 50 to 250 gal; 5,000 cps., 15 to 100 gal.—*Premier Mill Corp., Geneva, N. Y.*

Circle 113C on Reader Service Card



Froth Floation Unit Separates Selectively

This Key froth flotation cleaner selectively and automatically separates food products from the waste material and foreign matter.

Flotation principle relies on differences in "wetability" rather than density of product being cleaned and foreign matter being removed. The variation in "wetability" allows the process to selectively attach air bubbles to waste material causing a change in its effective density so that it floats on top of solution. Primary food product meanwhile is allowed to sink to the bottom of the separator and is then discharged into draining reels.

Separation is achieved through use of an oil-in-water emulsion into which air is incorporated in small bubbles. A foaming agent is added to this solution to maintain the stability of the solution and emulsify the oil and water. Distributor for United States, Canada, Hawaiian Islands is—*Food Machinery and Chemical Corp., San Jose, Calif.*

Circle 113D on Reader Service Card

performance IS THE BEST TEST OF leadership

PHILADELPHIA GEARMOTORS

have "stood the test" on hundreds of installations

In almost all branches of industry Philadelphia GearMotoRs are giving the trouble-free service that is proof of their excellent design and precision manufacture.

Where the direct application of electric drive to individual machines is desired the Philadelphia GearMotoR will conserve space and simplify the installation as well as offer definite operating advantages.

They are available in single, double and triple reductions with a speed range from 780 through 7.5 R.P.M. Motor ratings run from 1 HP through 75 HP AC or DC.

Our Catalog GM-48 gives full details.

CONSTRUCTION FEATURES

Compact without sacrificing strength or accessibility.

Self-Contained Motor and Gear Unit are combined yet readily separated for inspection . . .

Quiet Simple gear train minimizes number of moving parts and promotes quiet operation.

Standardized Construction Interchangeable parts simplify assembly and maintenance.

Prompt Delivery—Most motors in stock.

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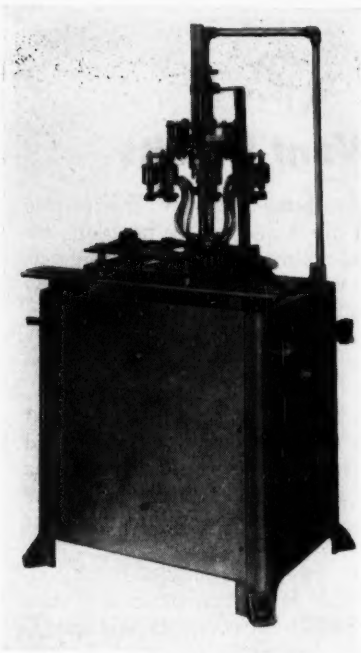
LimiTorque Valve Controls



Filler Protects Product By Employing Nitrogen

Product contamination from entrapped air in filling operations is eliminated with use of this new depositing machine. Unit automatically displaces air in container with nitrogen.

In operation, a stainless steel nozzle fits over mouth of container and emits a stream of nitrogen gas downward forcing out trapped container air through a separate opening. Machine is designed to keep loss of nitrogen gas to minimum. Nitrogen pressure is controllable and shuts off automatically when machine is stopped.

Machine fits into any production line and requires no skilled help to operate. It can be changed over from one size container to another in a few minutes and will handle container sizes from fractional oz. to gal.—*MRM Company, Inc., 191 Berry St., Brooklyn 11.*

Circle 115A on Reader Service Card

New Chemicals

Pressure-Sensitive Tape Has Teflon Surface

A new and simple means of putting the unique properties of Teflon to work in a wide variety of applications is provided by a recently developed pressure-sensitive tape.

Named Temp-R-Tape-T, it has a base of Teflon, tetrafluorethylene resin.* Chemical resistance of resin and wide range of temperatures over which it maintains its properties indicate that tape can be used for sealing high-temperature and chemical ducts. Manufacturer indicates that tape, using a silicone polymer adhesive, is completely effective over temperature range of minus 80 to plus 400 deg. F.

Additional uses are as a facing material, providing a non-sticking surface for packaging machinery, and as an electrical insulating tape.

Tape adheres readily to a variety of surfaces including glass, aluminum, steel, phenolics, copper, and brass. It is being manufactured in widths varying from ½ to 12 in.—*Connecticut Hard Rubber Co., 407 East St., New Haven 9, Conn.*

Circle 115B on Reader Service Card

Contamination Minimized With New Lubricant

Through use of Petrol-Gel as an equipment lubricant, product contamination from this source is minimized. New product is reported odorless, tasteless, sterile and has high melting properties.

Maker states, it is made of U.S.P. white mineral oil and other U.S.P. ingredients and is compounded and packaged under strict sanitary standards. Material will not emulsify with water soluble liquids or foods. Since material is free from animal, vegetable fats and fillers, it is free from enzymatic action. Melting point is above 200 deg. F. Lubricant is packaged in 4 oz. collapsible tubes.—*McGlaughlin Oil Co., 3750 E. Livingston Ave., Columbus, Ohio.*

Circle 115C on Reader Service Card

Non-Skid Floor Coating Is Easy To Apply

In plants where oils, greases and chemicals create safety hazards and maintenance problems, a safe footing and long lasting surface is provided with use of NeoFlor, a new and easily applied skid-proofing coating for concrete, wood and metal floors.

New surfacer is a grit-like material anchored in a matrix of resilient neoprene and bonded firmly to the floor with an adhesive primer. Both primer and coatings are supplied in liquid form for easy, quick-drying application with brush or roller.

New coatings are resistant to fumes, spillage from acids, alkalies, salt solutions and solvents at temperatures up to 220 deg. F. Also waterproof, they are impervious to oils and greases and are easily cleaned with commercial detergents.—*Pennsylvania Salt Manufacturing Co., Philadelphia 7.*

Circle 115D on Reader Service Card

Petroleum-Base Spray Speeds Lubrication

A sanitary, petroleum-base spray, packaged in an easy-to-use aerosol container, may do away with the messy finger-wipe methods of lubricating dairy and food processing equipment.

Big advantages of push-button product, manufacturer says, are its ease and speed of application and elimination of possible contamination attendant to methods by which lubricant was spread on with fingers. Aerosol product is stated to meet U. S. Pharmaceutical standards, and conforms with milk ordinance and code recommended by the U. S. Public Health Service.

Because it contains no animal or vegetable fats, maker adds, it will not turn rancid. It's also odorless, tasteless, and nontoxic.

While spray lubricant is recommended particularly for use on sanitary valves, homogenizer pistons and rings, sanitary seals, capper equipment, glass and paper filling machine parts, and other equipment which requires daily cleaning, it can be used as an all-purpose, thin-film lubricant on any food processing equipment. DuPont "Freon" fluorinated hydrocarbon, a liquefied gas which expands rapidly when released from pressure, provides the propellent force in the push-button container. — *Haynes Manufacturing Co., 709 Woodland Ave., Cleveland 15, Ohio.*

Circle 115E on Reader Service Card

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In Behalf of Progress . . .

Don't Dominate a Conference If You Want Results

Two heads are better than one. Several better than two. So it pays big dividends to tap all the brains available in developing the solutions to company problems or in planning new projects.

Most men who direct any operation, big or small, are aware of this. And a high percentage of them use the conference technique. Yet not one in a hundred knows how to lead a conference to produce the best results—to thoroughly and effectively pick the brains at the conference table.

A prime requisite of conference leadership is advanced preparation. Each conferee should be provided with all the information and ideas available to the leader on the topic to be discussed. And, of course, the objective of the conference should be definitely defined.

A second essential of conference leadership is that the man at the head of the table lead the discussion —not dominate it nor dictate to the conference. It is not the function of the leader to tell the conferees what to think. It's quite the reverse. His job is to induce the others at the session to think for themselves and voice their thoughts as a contribution to the pool of ideas and information. For out of this pool is to come the answer to the problem under discussion.

The leader must stimulate discussion and at the same time control the participants. In some instances he will have to tactfully "terminate" a talker. In others, he will need to bring a reticent conferee into the discussion by a direct question or by asking for his comments on points made by another conferee.

All the way through the conference, the leader must head off private conversations and discussions, put a damper on the "show-off's," prevent personality clashes, pep up the session when it lags, and cool it off if it gets too hot.

When a conferee asks a question or makes a point calling for reply, he usually should not be answered by the leader. Instead, another conferee should be called upon for his comments. This playing of one conferee against another is a good way to bring out the thinking of the group.

A final important duty of the leader is to summarize the points made at the conference and state the conclusion upon which the conferees have agreed. Then, if anyone has been misunderstood, he can put the leader straight.

Now, there may be fundamental reasons why a leader cannot accept the conclusion. In which case he should clearly explain the situation and leave the group in an understanding frame of mind.

Many conferences are held to gather ideas—rather than to reach a conclusion. These are very productive, and are easier to handle.

Many points are involved in conference leadership. So your company can benefit greatly from a course in conference leadership for supervisory personnel.

Take a Hand in Spreading Food-Career Facts

Unfortunately, the public at large is intelligently aware of only the distribution and farming phases of the food business. So young people do not grow up with a yen to enter our industry.

While the job of wiseing up the public about our industry needs very much to be done, it is at best a long-range operation. And the industry cannot wait long to bring more technical talent into its fold.

No, the only solution is to go directly, and immediately, to the raw material from which engineers and scientists are made. That is, to high school students who plan to take technical college courses.

That this not only can be done, but produces results, recently has been demonstrated. The Food Engineering School of Illinois Institute of Technology on January 20 published an advertisement in the mid-year school guide of a Chicago newspaper. And in no time at all 39 inquiries came in from prospective students.

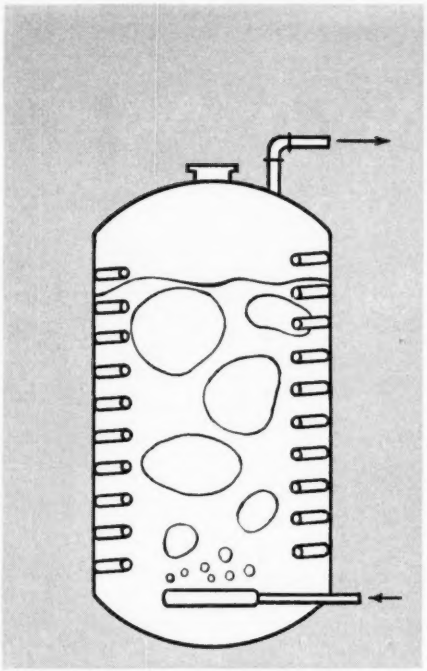
Then press releases containing information about the industry were sent to food company house organs. These immediately pulled 15 inquiries from high schools in 9 states, as well as from the education departments of two great states.

And remember that for every one who inquires, many, many more read and are impressed.

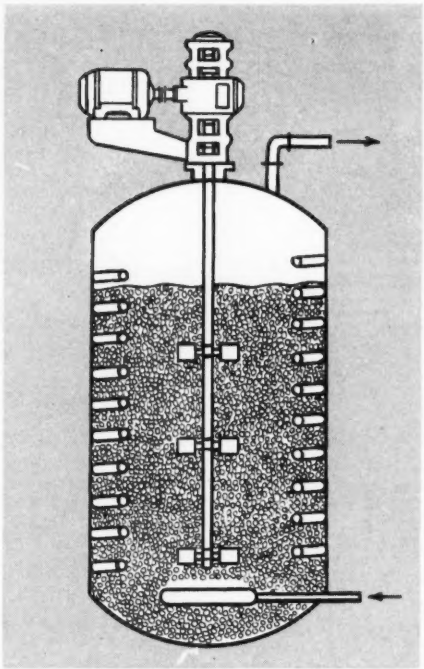
Other steps can, and are, being taken to increase enrollment in technical food courses. These include (1) Conferences at which men from the industry address high school science teachers. (2) Plant and laboratory tours for teachers and their students. (3) Placement of posters in plants and schools. (4) Distribution to teachers and students of printed information about the career opportunities in our field.

Several thousand copies of the article "Rewarding Careers Await Technical Men in Food Industry," published in the February issue of FE, will be put to work by schools, companies, and associations in the food field. And if your company has not done so, perhaps it should consider making use of this specially prepared material in one way or another.

Only if everyone concerned takes a hand can enough people be led into technical food careers to meet the needs of progress.

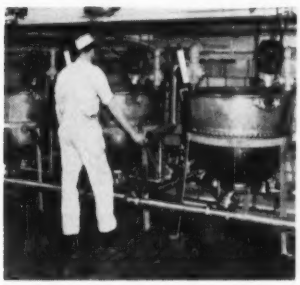


SLOW . . . Large steam bubbles rise directly through batch. Contact with hot lard is limited.



FAST . . . Dispersed into thousands of tiny bubbles, steam circulates again and again through lard.

LARD DEODORIZING, hydrogenation, and other big mixing jobs are handled rapidly with turbine-type LIGHTNIN Mixers. Hundreds of power-speed combinations, for open or closed tanks. Sizes 1 to 500 HP.



MIX ANY FLUIDS, in any open vessel, with the proper LIGHTNIN Portable Mixer. It sweeps the tank bottom, turns the batch over while rotating it, for thorough, uniform mixing, without baffles. Thousands in use. Sizes ⅛ to 3 HP.

Strip lard 47% faster

This simple change saves steam—and keeps your product homogeneous

You can strip free fatty acids from lard in half the usual time—with one simple change in the process.

The diagrams above show what happens when you add a LIGHTNIN Mixer to the stripping vessel. Steam entering the vessel is dispersed instantly in thousands of pinpoint bubbles.

Driven through and through the hot lard, these bubbles give many times the interfacial contact you get with sparge pipes alone. Tests show this cuts lard deodorizing time from 30 to 50%.

As a further result, you save steam—in the vessel and in the ejector system. Since operating time is so much shorter, you use much less steam to maintain the vacuum and to heat the vessel.

The mixing action keeps the lard homogeneous, too—prevents settling of heavy components.

This is just one of hundreds of jobs food processors handle with LIGHTNIN Mixers. For quick competent help on steam stripping, or *any* fluid mixing operation, call your LIGHTNIN representative. Or write us today.

Lightnin® Mixers

GET THESE HELPFUL FACTS ON MIXING

LIGHTNIN Catalogs contain practical data on impeller selection; sizing; best type of vessel; installation and operating hints; full description of LIGHTNIN Mixers. Yours without obligation. Check and mail coupon today.

MIXCO
fluid mixing specialists

- ☐ DH-50 Laboratory Mixers
- ☐ DH-51 Explosionproof Laboratory Mixers
- ☐ B-102 Top Entering Mixers (turbine and paddle types)
- ☐ B-103 Top Entering Mixers (propeller type)
- ☐ B-104 Side Entering Mixers
- ☐ B-105 Condensed Catalog (complete line)
- ☐ B-107 Mixing Data Sheet
- ☐ B-108 Portable Mixers (electric and air driven)

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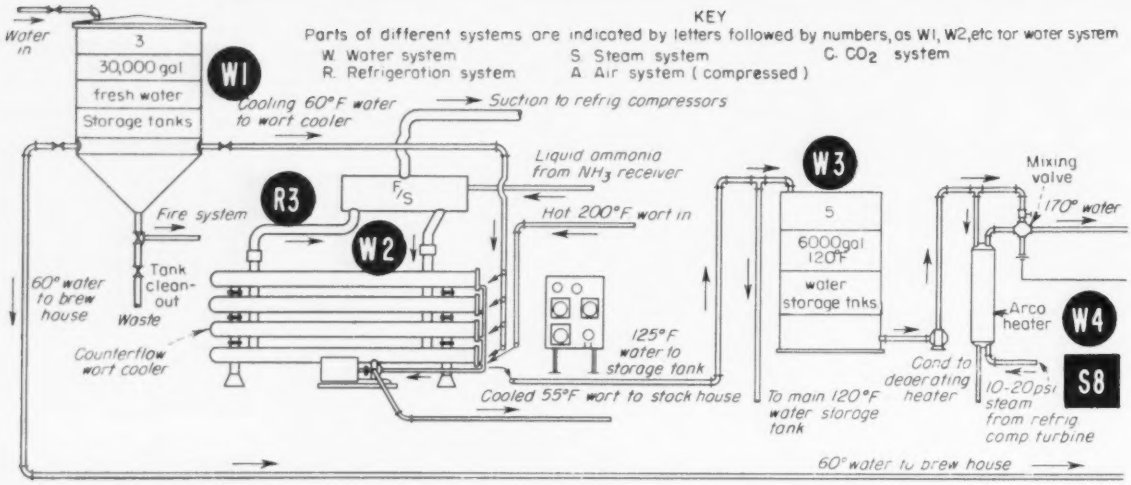


SYSTEM CONSERVES ENERGY

How high efficiency is achieved in utilization of water, steam, refrigeration, carbon dioxide, and compressed air in food process

WITH some 600 years to perfect energy balances, breweries are ahead of many other types of food plants in efficient use of water, steam, refrigeration, carbon dioxide, and compressed air. Yet, they are applying advanced engineering and equipment to achieve still higher process economies.

This flowsheet shows the advanced process-energy engineering at the San Francisco Brewing Co.

Saves Water and Btu.'s

Beer being a beverage, the use of water in the product and as a heating-cooling medium is of top-drawer importance. From fresh-water storage tanks (W1), water at 60 deg. F. is used to cool hot wort—some 155,000 gal. of it a day. This heat exchange (W2) increases the temperature of the cooling water to 120 deg. And the water is stored (W3) at this temperature to be used in the product, or as a heating medium. When used for process heating, its temperature is raised, in a 450-gpm. instantaneous steam water-heater (W4). Then the temperature is automatically adjusted to 170 deg. by the addition, through a mixing valve, of more 120-deg. water from the storage tanks.

BEHIND this efficient energy system for food processing is a significant story of plant modernization to meet competition. This is told in the article starting on page 60. There, too, you will find many more details about this achievement in engineering efficiency.—The Editors

Approximately 86,000 gal. of 170-deg. and 55,000 gal. of 120-deg. water per day are used in the process (W5, 6, 7). The surplus 14,000 gpd. of 120-deg. water goes into a storage tank (W8) to be used mainly for boiler feed-water. Thus the thermal advantage resulting from the increase in water temperature in the wort cooler is utilized.

Water for cooling the air and ammonia compressors (W9, 10, 11, 12) is thermostatically controlled to discharge from these machines at 120 deg. Approximately 28,000 gpd. of this water is also added to the surplus storage tank.

Forty percent of the boiler feed-water make-up (32,000 gpd.) is pumped to the deaerating heater (W13) and combined with returned condensate from the steam system. Then this water is heated to 235 deg. by 10 to 20-psi. steam from the exhausts of the boiler feed-pump and refrigeration-compressor turbines.

This completes the hot-water cycle, except for the water used in the bottle shop for soakers and washers (W14). All water that it is practicable to reclaim from the bottle shop is filtered (W15) then stored (W16). Subsequently, it is used in this same department in the pasteurizers.

Additional units using a relatively small amount of water for cooling are the compressed-air system (W17) and the ammonia evaporative condensers (W18).

High Steam Efficiency

Three, 1000-bhp. boilers ((S1) provide 150-psi. steam for this system at a rate of 50,000 lb./hr. First to be served are the steam turbines (S2, 3), the cereal cookers (S4, 5, 6), and the brew kettles (S7).

Reduced to 70 psi., 15,000 lb./hr. of this supply is used by the cookers. One of these, the rice cooker (S4), is operated under 10-psi. pressure. Steam demand of the brew kettles is 14,945 lb./hr. at 30 psi. The two turbines require 9,000 lb./hr., and the balance is utilized in the bottleshop.

A 40-hp. turbine operates a boiler feed-water pump, and a 200-hp. turbine drives a 200-ton, VW-Type, 8-cyl. refrigeration compressor. This horsepower costs very little, because the exhaust steam from these turbines serves the instantaneous, steam water-heater, the CO_2 vaporizer, and the deaerating heater.

Turbines act as pressure-reducing valves, lowering the 150-psi. steam to 10 to 20 psi. This variation in the reduced pressure results from a lack of uniformity of steam demand by the various units in the system.

Advanced Refrigeration

The refrigeration system is a completely flooded ammonia system operating at an average pressure of 150

UNFOLD HERE

psi., with the pressure varying from 130 to 170 psi. according to the load. The heart of this system comprises six ammonia compressors of 50- to 200-ton capacity (R1 and R2) which develop 1,000 tons of refrigeration.

Suction from all refrigeration units (R3, 4, 5, 6) passes through an ammonia accumulator before reaching the compressors. An efficiency and human-mechanical safety factor, this accumulator reduces any saturated gas—even liquid ammonia—to dry gas before it enters the compressor units.

Variation in refrigeration demand often creates overloads, resulting in a slop-over of liquid ammonia or the return of highly saturated gas. The heated coil, housed in the accumulator, dries the gas before compression and discharges any liquid ammonia to the ammonia receiver.

Discharge from the compressors (180-250 deg. at 150 psi.) is first reduced to 80 deg. in the desuperheaters, then further cooled to 50 deg. in the evaporative condensers. The ammonia, now in the liquid state, is returned to the ammonia receiver to complete the cycle.

Brine, at 18 deg., is supplied through a system to the temporators (R6A) and the house air conditioning systems as demanded.

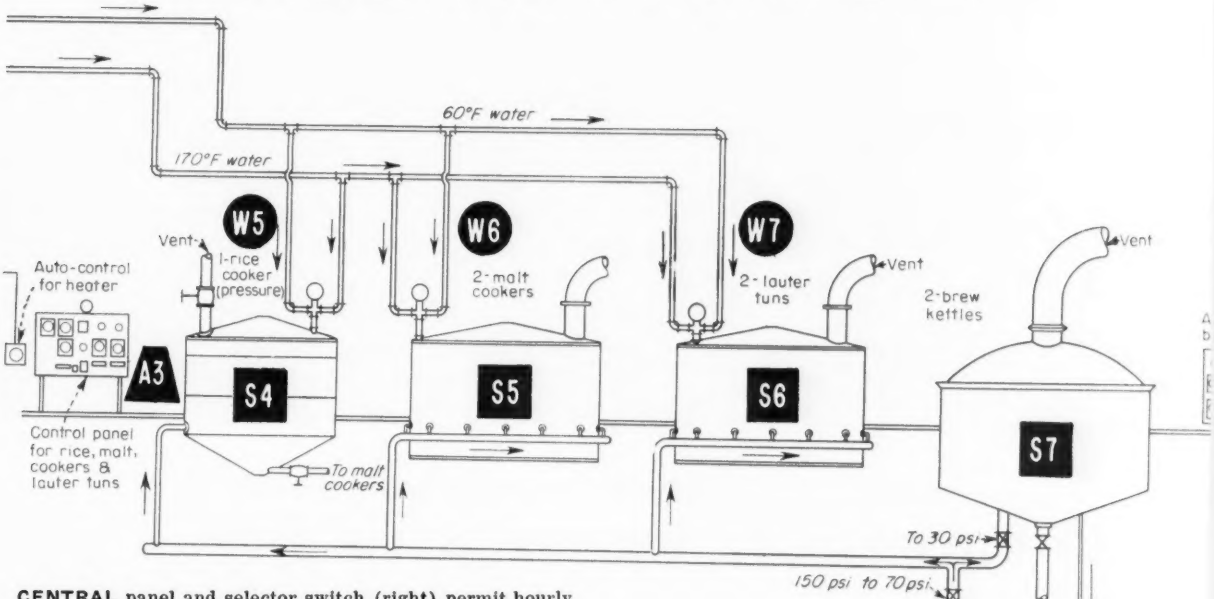
Carbon Dioxide System

Three carbon dioxide compressors (C1) take suction from tanks (C2) producing CO_2 and compress it to 250 psi. Now in liquid state, the CO_2 is stored. This liquid is then vaporized as needed (C3) then filtered to remove any undesirable flavors. It is employed to carbonate beer or as counter-pressure to unload tanks rapidly.

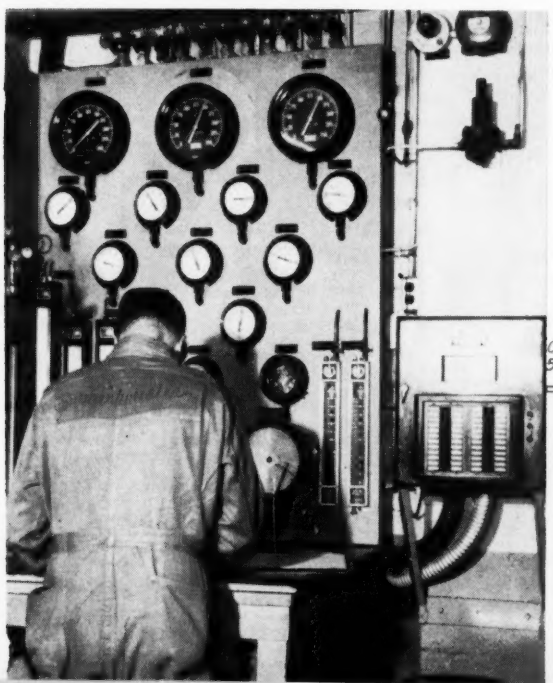
Clean, Safe Compressed Air

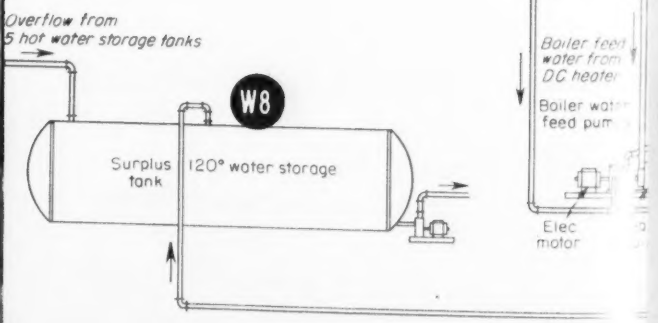
Three air compressors (A1) provide an adequate supply of 100-psi. clean compressed air to storage tanks (A2). These tanks are located on the roof above the engine room for safety and convenience. Usual demands are about 1,000 cu. ft. a minute.

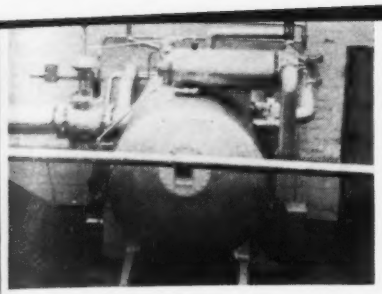
FOOD ENGINEERING FLOWSHEET NO. 64 April 1954 Pages 118-121



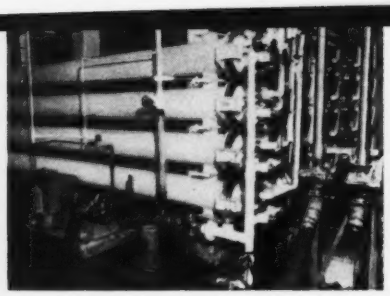
CENTRAL panel and selector switch (right) permit hourly temperature check on 48 stations.



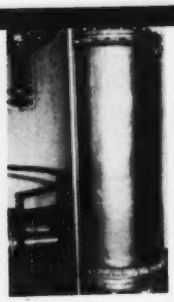




W13 Boiler feed-water is supplied by deaerating heater.

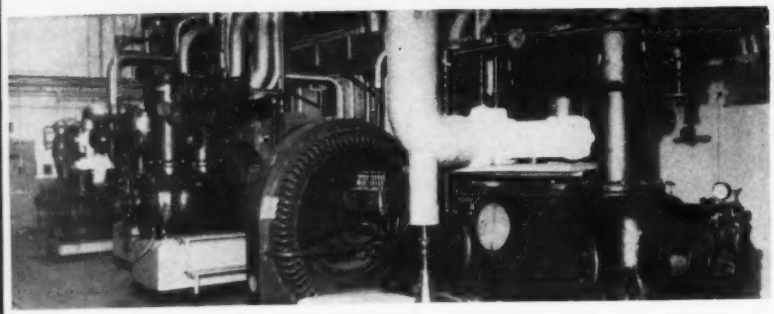


W2 Heat exchanger cools wort from 200 to 55 deg. F.

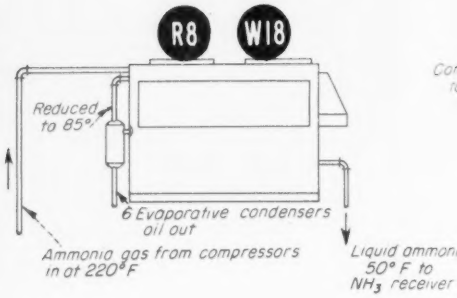


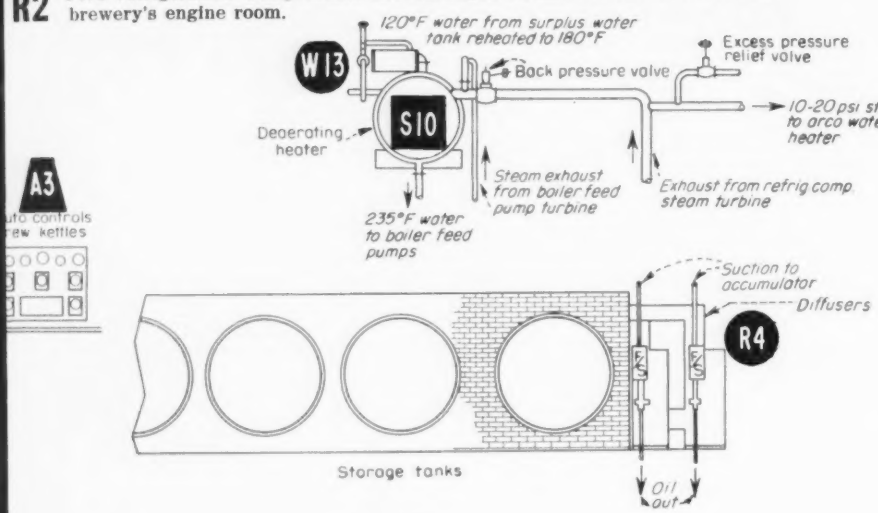
W4 Steam water heater.

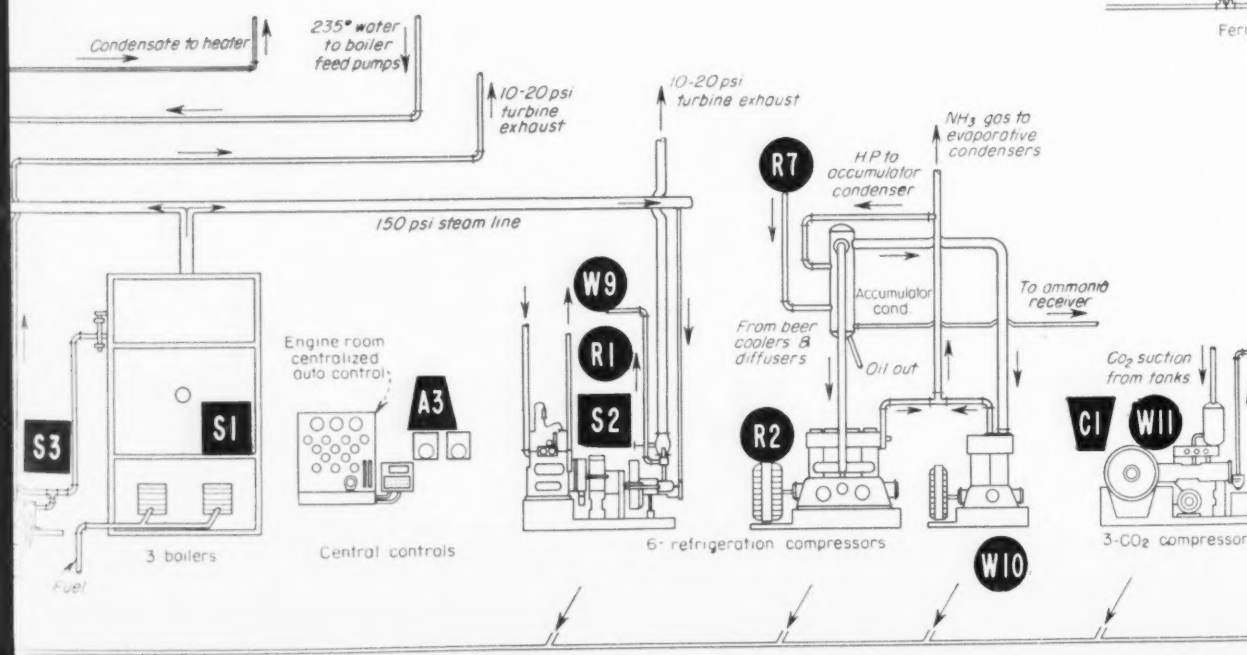
R1 Turbine-drive r... treme left) and ...



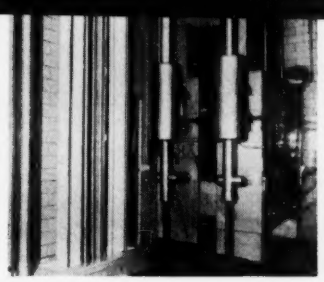
R2 Five refrigeration compressors are arranged in-line on one side of the brewery's engine room.



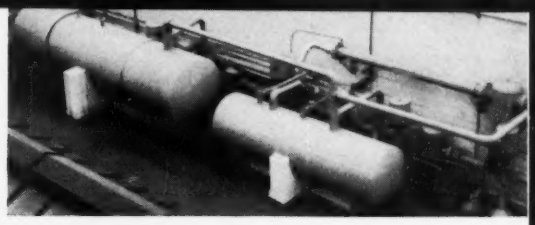




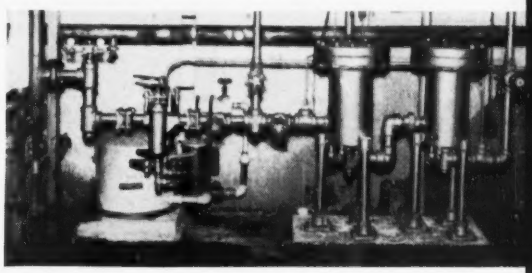
ive refrigeration compressor (ex- and air and CO_2 compressors.



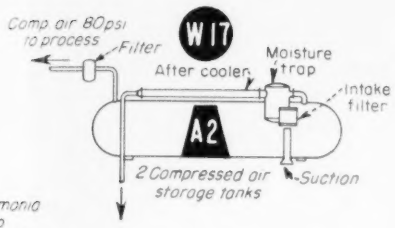
R4 Two of 30 cold diffusers which serve cellars.

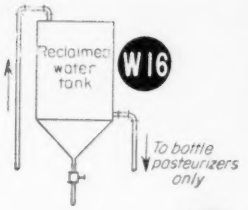


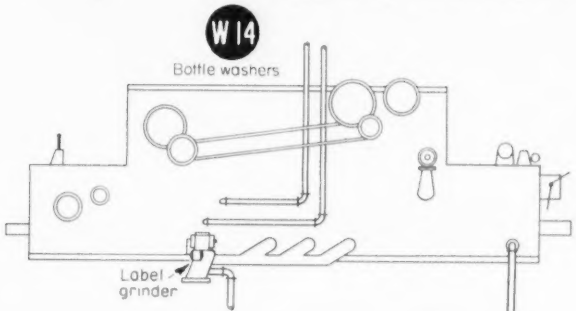
A2 Compressed-air storage tanks on roof, with filters, coolers, moisture traps.

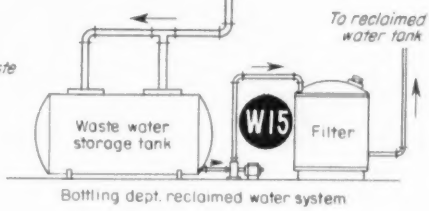


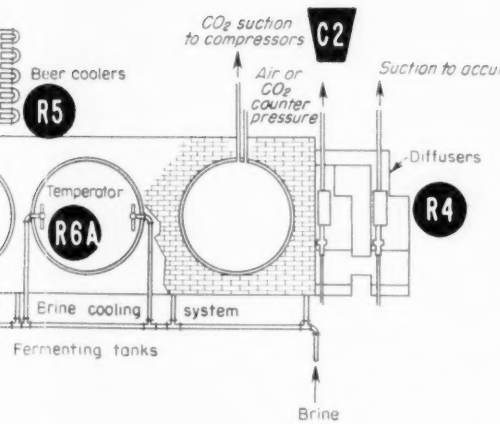
C3 CO_2 gas, at 150 psi., is passed through two filters before being used.

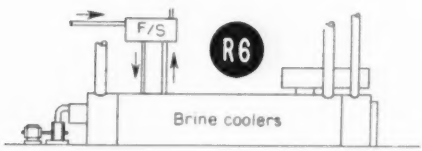


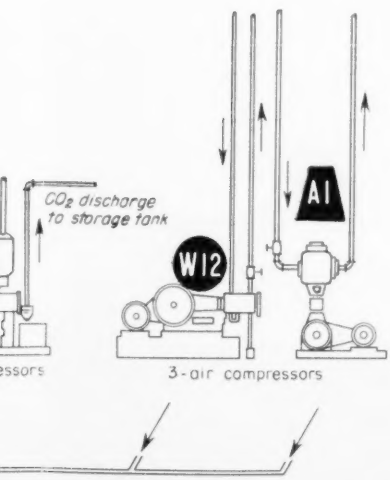


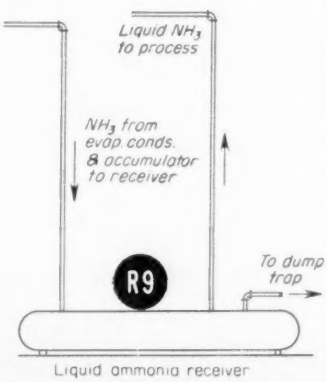


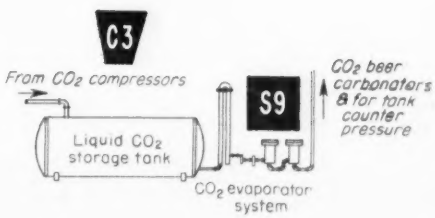












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New INTERNATIONAL R-195 ROADLINER® with famous Super Red Diamond engine. Gasoline, LPG, or diesel power. GCW rating, 48,000 lbs. Wheelbases 133, 142 and 157 inches.

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For the 22nd straight year, men who know hauling costs have bought more heavy-duty INTERNATIONAL Trucks than any other make.

The reason is INTERNATIONAL *quality.* And cost records prove it. Operators' records show that INTERNATIONALS stay on the job longer . . . deliver more tons of payload for each dollar invested.

It will pay you to see your INTERNATIONAL Dealer or Branch. Let him show you how these built-for-the-job trucks can do a cost-lowering job for *you.* Time payments arranged.

INTERNATIONAL BUILDS AMERICA'S MOST COMPLETE TRUCK LINE

170 basic models from ½-ton pickups to 90,000 lbs. GVW off-highway models . . . including six-wheel, four-wheel drive, cab-forward and multi-stop delivery types . . . 29 engines from 100 to 356 hp., with widest choice of gasoline, LPG, or diesel power . . . wheelbases, transmissions and axle ratios for any need . . . thousands of variations for exact job specialization.

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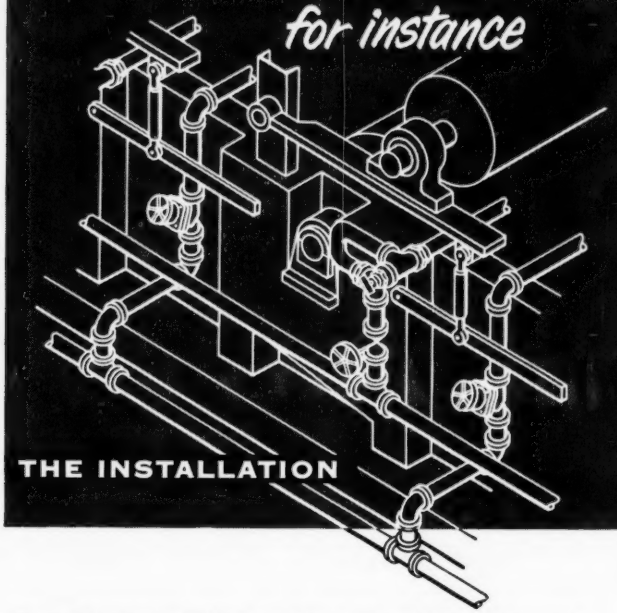
Before you buy any truck remember **Cost-conscious Truck Operators Prefer INTERNATIONALS!**

International Harvester Builds **McCORMICK®** Farm Equipment and **FARMALL®** Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

Better roads mean a better America

INTERNATIONAL® TRUCKS
"Standard of the Highway"

Doing What Other Valves Couldn't ...on Slurry Service, for instance



Crane Diaphragm Valves on slurry-like white water service to cylinder tanks on paper-making machines at Excello Paper Products Co., Inc., Cincinnati.

VALVE SERVICE RATINGS

SUITABILITY:
"Made to Order" for tough jobs

FEATURES:
Seats tight where others fail

MAINTENANCE COST:
None - needs no attention

SERVICE LIFE:
Many times longer than expected

OPERATING RESULT:
Plant efficiency improved

AVAILABILITY:
Crane Catalog item - No. 1610

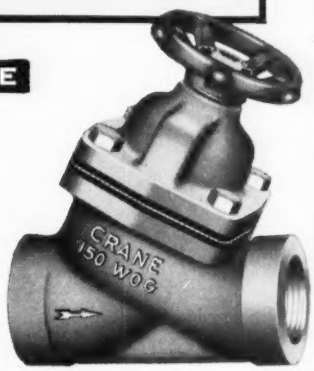
THE CASE HISTORY

Valves formerly used had been giving much trouble that started between tank fillings. While many replacements were tried, none of the valves could handle the white water solids and fibers that built up in the bonnet and seats between operations. Result was the valves were hard to operate, and leaked at the seats.

Keeping up with valve maintenance and the hazardous, messy floors caused by white water leakage was costly and annoying. But it was a problem that Crane Diaphragm Valves solved handily. The leakage stopped—machine room efficiency went up as the safety hazard was gone—plant appearance improved. Installed about a year ago, Crane Diaphragm Valves keep doing these things without a penny's maintenance cost to date.

THE VALVE

Crane Diaphragm Valves are packless. Bonnet and working parts are sealed to line fluid; there's no place for sediment to build up. Independent disc and diaphragm design saves wear on diaphragm, permits valve to be closed even should diaphragm fail. Pliable disc insert seats tight on foreign particles that cause leakage and wire drawing in ordinary valves. Choose these valves from wide variety of body and trim materials for corrosive, abrasive, and ordinary services. See your Crane Catalog or Crane Representative.



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Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For more information, use coupon on page 175.

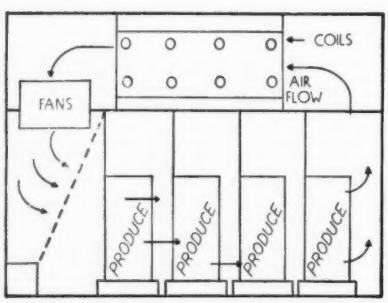
HOW WESTINGHOUSE FANS QUICK-FREEZE BERRIES TO MINUS 40°

When the berry packing season starts in Whatcom County, Washington . . . huge (110 ton capacity) freeze tunnels require fast, efficient air movement at 40° below zero . . . operating night and day for 3 solid months.

Baker Cold Storage Company called in the local Westinghouse-Sturtevant sales engineer and found that Westinghouse had the answer.

The result: eight Westinghouse-Sturtevant Axiflo Fans cold-blast the packaged fruit with 140,000 cubic feet of air per minute. This air moving system was originally guaranteed to freeze 46 tons per day . . . now handles 100 tons in a 24 hour day. Westinghouse fans have handled this grueling task with never a let-up for the past 8 seasons.

Whatever your problem in putting air to work, you will find the Westinghouse-Sturtevant sales engineer the most capable man to contact. Call your local Westinghouse-Sturtevant office or write Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

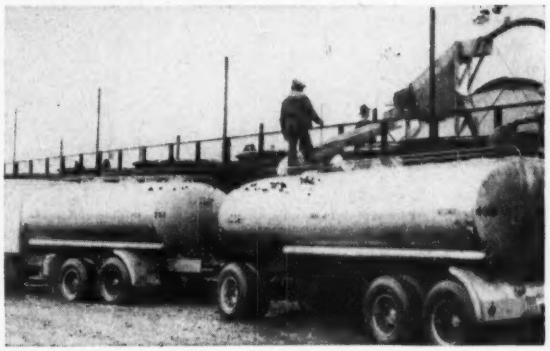


Eight Westinghouse Axiflo Fans deliver a total of 140,000 cfm of air at a temperature of minus 40° from refrigerating coils mounted directly above loading area . . . distribute evenly around the packaged fruit. This air is drawn down and directed laterally across 4 rows of fruit trucks, 10 trucks to a row, and returned to the overhead refrigeration coils for re-cooling. Trucks are loaded into the tunnel a row at a time with approximately an hour before the next loading. Alternate loading and unloading results in continuous, efficient, quick freezing.

WESTINGHOUSE AIR HANDLING

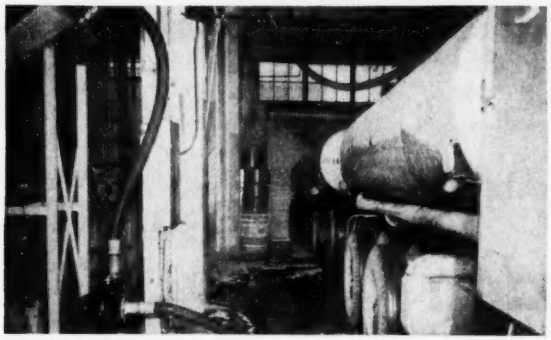
YOU CAN BE SURE... IF IT'S Westinghouse

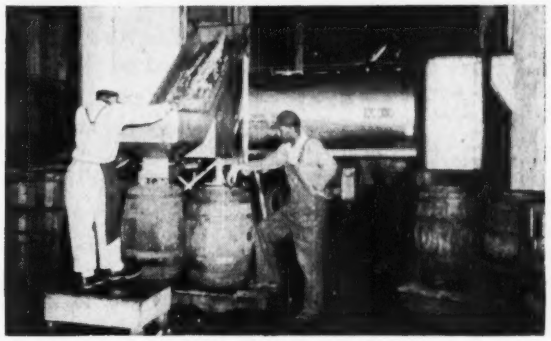
Monday: Loading Maraschinos at Salem, Ore.



FROM BRINING VATS TO CARRIER TANKS. Action shot (left) at Willamette Cherry Growers station shows brining vats, pumping equipment, and chute leading into tank trailer. Right photo: Capacious payload-increasing truck-trailer that holds equivalent of 110 of old 250-lb. (net) barrels.

Tuesday: Unloading at San Francisco





FROM CARRIERS TO PROCESS. Twenty hours later carrier is tapped (left) at Lyons-Magnus. Cherries go by hose and pump (left foreground) to grid (top left) that removes foreign matter. Overhead line adds extra brine. Right photo: Fruit floods over grid into barrels, which go to processing.

Tank Trucks Replace Barrels

Boosting Loads 20% . . . Saving $75 a Ton in Costs

E. E. JACOBS

Vice-President, Lyons-Magnus, Inc., San Francisco

Ever since maraschino cherries have been made, the fruit has been packed, shipped and, prior to processing, stored in SO_2 brine in 50-gal. wooden barrels.

As with so many other operations, however, this one has become plagued with soaring costs—of barrels, materials handling, labor, and transport. Cooperage costs alone have increased to the point where this method of handling has become prohibitive.

Early in 1953, Lyons-Magnus, Inc., San Francisco, and Willamette Cherry Growers Assn., Salem, Ore., began searching for a more efficient and economical method to handle the fruit.

Result: Cherries are now brined in 12,000-gal. tanks and shipped from Salem to San Francisco in tank trucks. This new method eliminates barrels, improves materials handling, and brings savings of more than $75 a ton of fruit.

Net weight of fruit shipped in barrels never exceeded 50% of the gross weight of cherries, brine, and barrel. But by proper control of amount of brine added as a cushion for the fruit in the tank truck, "payload" has been increased to at least 70% of the gross weight of the shipment.

In handling the movements of sizable tonnages of cherries from Salem to San Francisco over the last six months, Arrow Transportation Co. of Portland, Ore., and the Clyde Le Baron Co. of San Francisco have cooperated closely with buyer and shipper. Arrow has provided the stainless steel tank trucks. And Le Baron (broker for Willamette Cherry Growers) has helped coordinate the movement of cherries southward and other liquid commodities (liquid sugar and wine) northward.

Since the cherries have been moved on a "carrier convenience" basis, the scheduling of loads (mostly by the broker's office) has played an important part in the success of the operation. Oregon-California runing time is about 20 hr. (*Turn to page 189*)

a dependable preservative from a reliable source . . .

for preserving the flavor and quality of food, beverages, syrups, concentrates . . . safely and economically

Heyden SODIUM BENZOATE

Other Heyden products important in flavoring and preserving . . .

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Parahydroxybenzoates • Pentaerythritols • Propyl Gallate • Resorcinol • Salicylates • Salicylic Acid

SPACIOUSNESS PLUS. Indicative of part plant design, landscaping, and ample parking space will play in future is new facility of Carnation Co., Phoenix, Ariz. Retail store (as seen right) will feature many dairy plants.

TOMORROW'S FOOD PLANT

WILL HAVE—

- ★ Simple Design
- ★ Minimum of Partitions
- ★ Large Parking Area
- ★ Air Conditioning
- ★ Greater Sanitation
- ★ Basement Warehousing
- ★ Attractive Appearance
- ★ Automatic Cleaning

JOHN H. FORSLEW
Chief Engineer, Carnation Co., Los Angeles

Present operating practices and equipment designs suggest very definite trends that will surely influence the make-up of the food plant of the future.

It will be built on a traffic-keyed site large enough not only to house all operations but also to allow ample room for parking of employee and visitors cars.

Interior simplicity, with a minimum of rooms, will be a feature. The design will stress sanitation. Outside architecture also will be pleasing.

In the dairy field new forms of raw food products will effect plant design.

Powdered skim milk, powdered whole milk, powdered cream, and vegetable-fat frozen desserts are some of the products that will have a bearing on how we engineer our coming plants.

With the expected improved good quality and low cost of these products to the consumer, it is reasonable to expect that they will have their effect on the fluid milk and ice cream business, and consequently on our plants.

The city bottling plant today normally is a processing plant for a Grade A raw-milk product purchased at a premium price from the nearby producer. With powdered milk products manufactured from equal quality raw milk in distant outlying low production cost dairy areas, we may find that many of the city fluid plants will become reconstituting plants.

A manufacturer of imitation ice cream exclusively, using powdered skim milk and vegetable fat, certainly can have a simply engineered plant. With a proper-ingredient mixing tank ahead of pasteurizing vats with subsequent movement to the mix storage tanks, freezers, and automatic packaging equipment, it becomes a simple continuous process.

The raw products, powder and fat, can be stored in a dry warehouse with liquid sugar in tanks. Fruits and other minor ingredients will be all that require refrigeration ahead of freezing. The plant operator will have no bothersome season surplus of milk or cream to control and no real daily raw product inventory to regulate.

A similar process for manufacture of ice cream could result if butteroil is properly developed and produced in the large milk shed areas at low costs without price controls and local restricting barriers or regulations. It has been determined that skim milk powder and butteroil make a product of quality equal to most ice creams now on the market.

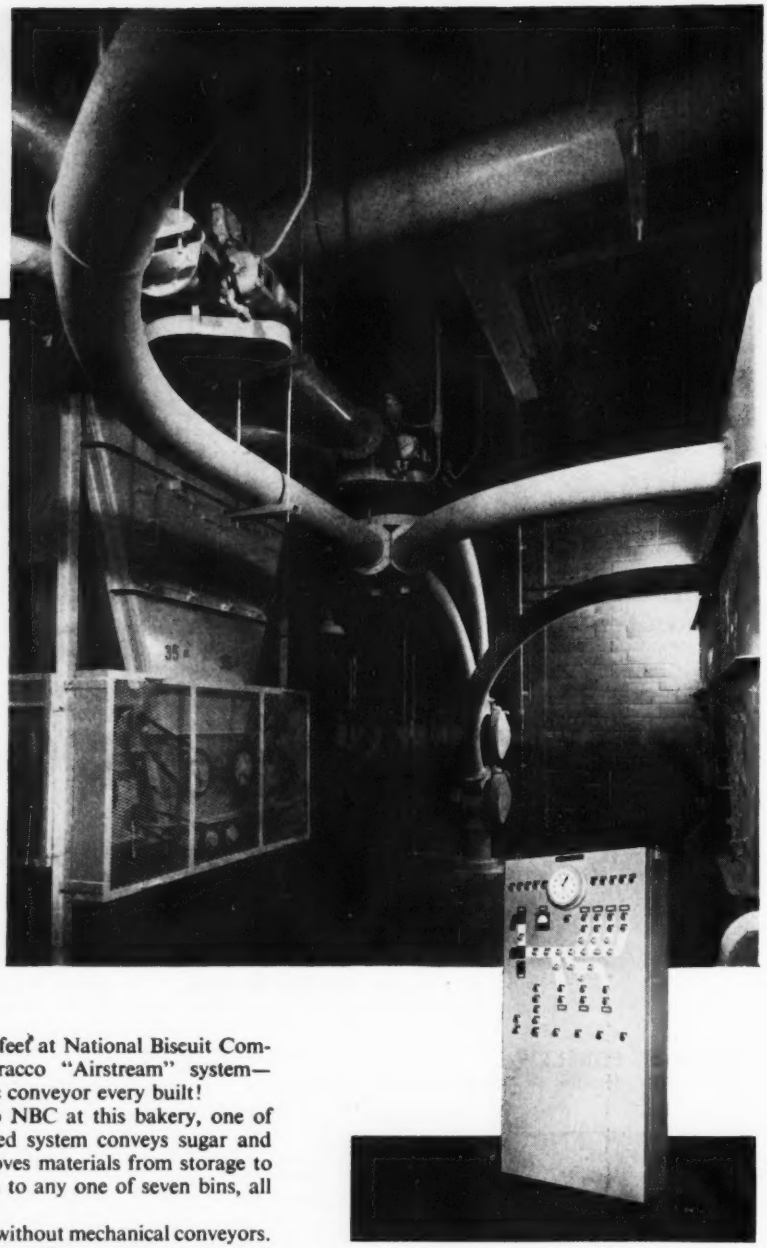
Combination Plants Seen

In engineering tomorrow's plant, I believe companies that are in both the milk and ice cream business should build combination plants.

For separate plants there are additional capital investments in building and equipment and partial duplication of plant engineering, maintenance operating personnel, and management control.

There are practical limits to the

here's a seven-armed baker's helper!



Stretching in serpentine-fashion for 800 feet at National Biscuit Company's new Chicago bakery is a Dracco "Airstream" system—probably the longest pressure-type pneumatic conveyor every built!

Absolute cleanliness is a vital necessity to NBC at this bakery, one of the world's largest. Dracco's custom-designed system conveys sugar and flour without loss at 10 tons per hour. It moves materials from storage to the processing department, then directs them to any one of seven bins, all ventilated by a Dracco Multi-Bag Filter.

This high-speed, dust-free handling is done without mechanical conveyors. The completely automatic "Airstream" system features motor-operated diverter gates and is run from a single control panel.

NBC thus realizes sanitary materials distribution with economy that is typical of Dracco "Airstream" installations throughout industry.

How's your materials handling?

NERVE CENTER—diagrammatic control panel shows layout of seven-armed Dracco Conveyor, permits centralized one-man operation.

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Airstream CONVEYORS · DUST CONTROL EQUIPMENT

number of trucks that can operate efficiently around one plant, but for larger installations relay stations located near centers of outlying population areas overcome this problem.

A plant should be accessible to traffic on at least three sides, with the office, visitors' parking, and landscaping, as required, on the front or fourth side. Here on the West Coast, we now speak of a plant site in acres —not, as formerly, in square footage.

Trucks should be housed adjoining the plant so they can be loaded in place at a time most efficient for the particular operation.

There are other allied operations that preferably must be located on the site, such as truck repair shop, body and paint shop, wash and grease racks, gas pumps, and ice cream cabinet shop. The best location will vary in different sections and climates but, in general, they should be kept distant from the plant so as not to interfere with normal operations and traffic flow.

Stress Public Appeal

Greater attention should be given to making plants more attractive to the public. And greater effort should be exerted to have the public visit the plant and view its operation. These will bring big advertising returns for relatively small additional costs.

To facilitate this requires:

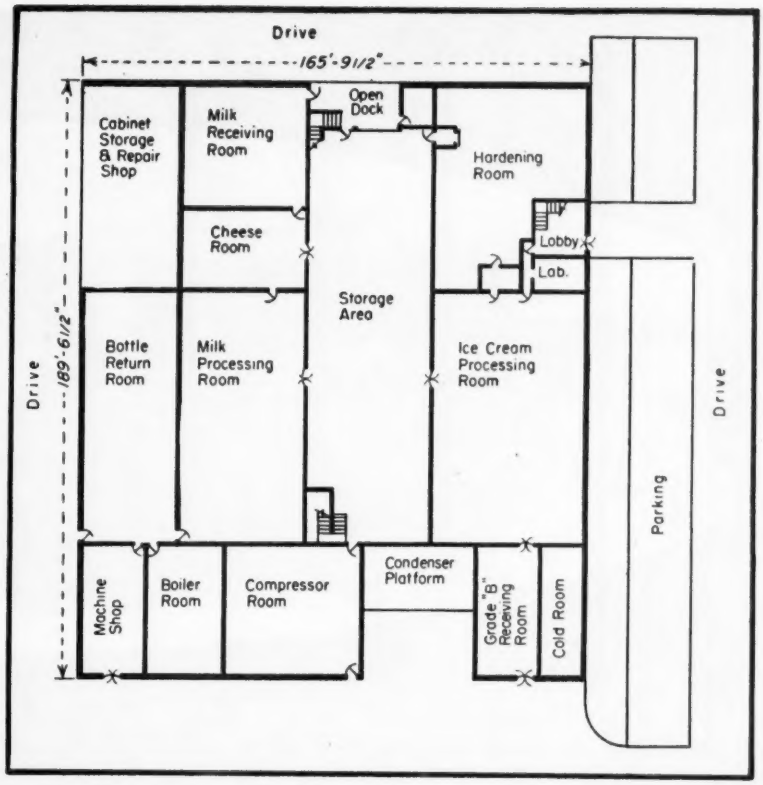
1. Better parking area for employees and visitors.
2. More attractive exteriors, obtainable with good architectural treatment, landscaping, and proper set-back from the front street and at the sides.
3. Floodlighting at night.
4. Judicious and tasteful interior decorating.
5. Attractive hostess room and kitchen suitably located and well arranged.
6. Plant design that will give a strong impression of sanitation.

Plants must be laid out for minimum sufficient space because of the ever increasing construction costs. At the same time a reasonable area must be provided for expansion. The building should be arranged so an addition can be made later without varying the general plant pattern, traffic flow, and operations.

Of utmost importance is simplicity of design and minimum of rooms and partitions. The arrangements will vary for small and large plants, so a standard pattern cannot be designed.

Central Warehousing

Preferred plant has all processing areas on the first floor, with a working warehouse in between the milk and ice cream sections. This warehouse is supplied by a freight elevator and conveyors from a basement warehouse.



FLOOR PLAN features minimum of partitions. Central working storehouse is supplied by elevator or conveyors from basement warehouse. High ceilings of processing rooms enable visitors to observe all operations from hostess room above central storeroom.

Primary advantage to a basement warehouse is that it also serves as the most practical area in which to pipe and electrically wire the plant. There must come a greater realization that service piping, such as water (hot, cold, and chilled), steam, refrigeration, and plumbing lines, must be neatly arranged and, where possible, carried in adjoining rooms or basement and then run into processing rooms.

Centrally located will be a room used for cleaned-in-place equipment from where CIP circuits will emanate. Automatic equipment will be developed to rinse, wash, and acid-sterilize sanitary circuits, all electrically timed and recorded, somewhat similar to automatic clothes washers. Cleaning and acid solutions will be stored in containers for re-use to reduce costs.

Main processing and filling rooms should have high ceilings with views from a visitors' hostess room. Rooms should give an unmistakable impression of sanitation. Among important features are: Generous spacing of equipment; red brick floors; light colored tile walls and ceilings; flush lighting; flush panels and control stations, and a minimum of overhead piping with a systematic grouping of the required piping.

Second floor of our plant would house the general office, with its private offices, drivers' room, visitors' room, kitchen, and the necessary lunch room, toilets, and locker rooms.

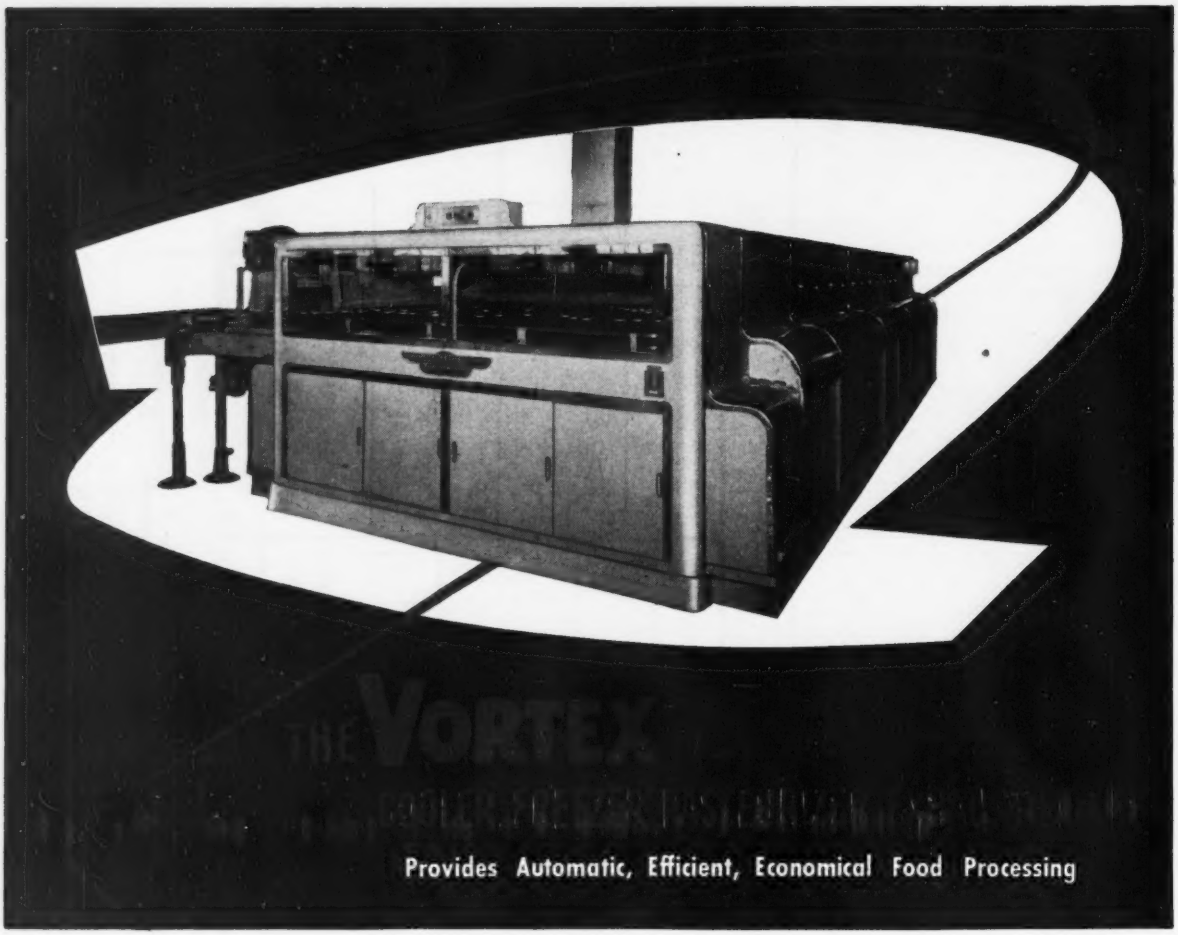
All future plants should be mechanically heated and ventilated. In most localities the plants, or at least the offices, will become air conditioned with proper zone controls.

Improved Truck Design

Main-line products should go directly to trucks in a properly synchronized plant, with perhaps the shorts being rehandled in a refrigerator room. Improved refrigerated trucks will take the place of our large refrigerator rooms. Ice refrigeration, as known so well in many plants, will disappear, with truck refrigeration taking its place and becoming a part of plant design.

Although there are many reasons for and against various types of truck refrigeration systems, I look for the eventual cooling unit to be a self-contained Freon package built into the truck body and powered with 440v., 3-phase motors. This will reduce wir-

(*Turn to page 134*)



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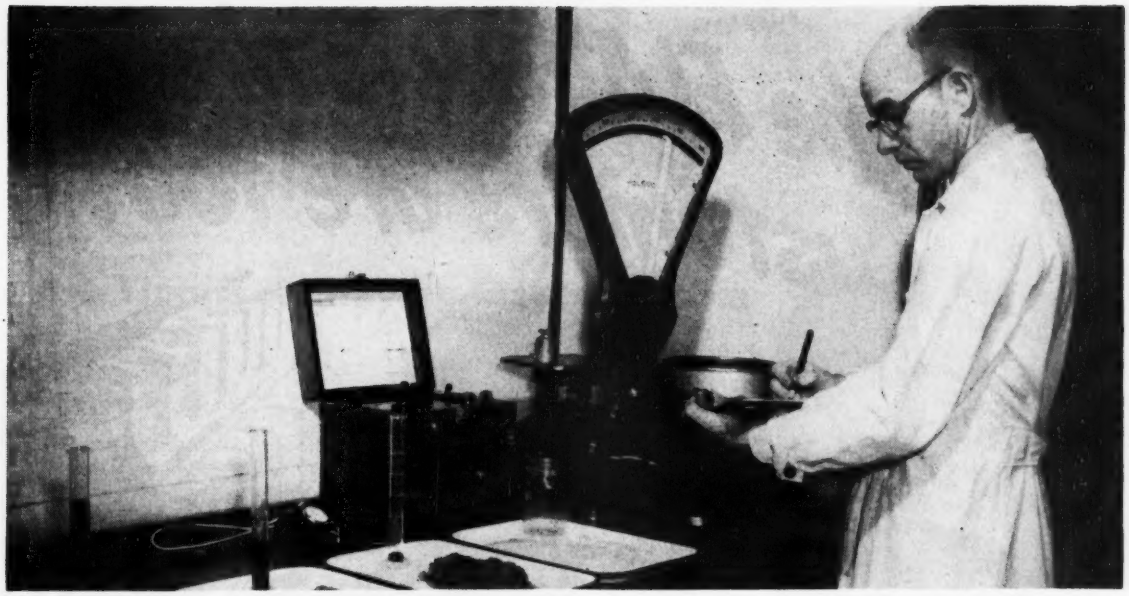

DRAINED-WEIGHT determinations were made by transferring relish from jars to circular screen (shown on scale) and allowing to drain 2 min. before weighing. Graduates (on enamel pans) show differences in drained liquid between control relish (left) and those containing thickeners.

Quell Separation in Pickle Relish

Certain hydrocolloids reduce liquid drainage, improve product's appearance and uniformity

E. E. ANDERSON, A. P. BLANK, and W. B. ESSELEN

Department of Food Technology, University of Massachusetts, Amherst. (Note: Author Blank now associated with Cryovac Division, Dewey & Almy Chemical Co.)

Bothersome separation of syrup from sweet pickle relishes during storage is greatly reduced by incorporation of small quantities of CMC or Irish moss extractive.

In addition, these hydrocolloids produce a more uniform finished relish that is organoleptically better than the untreated product.

These findings resulted from a study in which various concentrations of seven thickening agents were incorporated in sweet pickle relishes, which then were stored for 12 months at various temperatures.

Objects of the investigation were to determine: (1) Efficiency of hydrocolloids in reducing drainage or separation of relish components, and (2) effect of their incorporation on the color, flavor, "mouth-feel", appearance, and general quality of the finished relish.

Sweet pickle relish was supplied* in two parts: (1) "Dry-relish" components, and (2) syrup, containing sugar, acid, water, spices, coloring, and sodium benzoate. Dry relish was prepared by chopping partially freshened salt-stock pickles, cabbage, and peppers, then washing and centrifuging the mixture until a salt content of 2 to 2½% was obtained.

Finished relish was prepared by mixing seven parts by weight of dry relish with six parts of syrup.

Supplier of the Irish moss extractive recommended concentrations to employ.** Accordingly, in using the other hydrocolloids, we selected quantities that made up aqueous solutions giving approximately the same relative viscosities (see Table I).

Preparation of Packs

For those packs containing hydrocolloids, weighed syrup was heated to

(*Turn to page 200*)

TABLE I—QUANTITIES of Thickeners Added to Relish Samples

Thickener	Percent Added
Irish moss extractive (Type 5)	0.15, 0.30, 0.45
Sodium carboxymethylcellulose (CMC)	0.25, 0.50, 0.75
Citrus pectin (NF4487 #3)	0.25, 0.50, 0.75
Gum tragacanth (USP)	0.5, 1.0, 2.0
Gelatin (USP)	1.0, 1.5, 2.0
Waxy maize starch	1.0, 2.0, 4.0
Modified tapioca starch	1.0, 2.0, 4.0

TABLE II.—EFFECT of Various Concentrations of Hydrocolloids on Average Percentage of Drained Weight to Fill-In Weight of Sweet Pickle Relish

Thickener	Concentration Percent	Drained Wts. as % of Orig. Wts.* At 72 Deg. F.	At 113 Deg. F.
Control	0.00	91.5	92.4
Irish moss extractive	0.15	98.5	99
	0.30	98.9	99
	0.45	98.6	99.2
Sodium carboxymethyl-cellulose (CMC)	0.25	95.0	97.6
	0.50	95.5	96.6
	0.75	97.3	97.8
Pectin	0.25	92.2	94.6
	0.50	90.9	94.6
	0.75	91.8	92.8
Gum tragacanth	0.50	100†	100†
	1.00	100†	100†
	2.00	100†	100†
Gelatin	1.00	90.6	94.3
	1.50	88.6	90.3
	2.00	89.6	92.6
Waxy maize starch	1.00	95.1	96.6
	2.00	94.0	98.0
	4.00	94.9	97
Modified tapioca starch	1.00	93.5	92.6
	2.00	95.7	95.6
	4.00	93.7	95.2

* Courtesy D. M. Jewett Co., Inc., South Deerfield, Mass.

** Seaplant Chemical Corp., New Bedford, Mass.

* Drained weight percentages based on average of those found at end of 1, 2, 3, 6, and 12 months.

† Finished relish too thick or stiff to remove readily from jars; assigned values of 100%.

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8 Recent Legal Decisions

—Are Tipoffs on Staying Out of Trouble

LEO T. PARKER
Attorney at Law, Cincinnati

Pertinent decisions bearing on the food field were rendered by higher courts in the past year. Here, we'll run through a selected eight that offer most specific and practical guidance to the food processor.

In his never-ending need to steer clear of legal entanglements—or to ameliorate those encountered despite the best steering—the processor will do well to clip these briefs and put them in his "if" file.

Where further details might seem in point, readers readily may look them up—via the citations given—in any good library. And now, the cases:

Case 1—Wage Act Coverage

Questions continue to arise concerning the Fair Labor Standards Act: Which food-company employees are exempt from this minimum wage act? For example, are workers who cook, cure, or freeze food products unaffected?

First off, Section 213 (a) (5) of the Act exempts from minimum-wages and maximum-hours any employee engaged in the catching or cultivating of any fish, shellfish, or other aquatic forms of animal and vegetable life, including packing of such products for shipment, processing *other than canning*, curing, freezing, storing, or distributing and marketing.

But—employees engaged in *canning* fish, oysters, and like products, are within the provisions of the Act and, therefore, must be paid wages specified by this law.

A higher court lately decided that "canning" includes hermetically sealing, sterilizing, pasteurizing, and also other operations necessarily performed on the food so that it can be put into cans, bottles, or other containers, as well as actual placing of the commodities in the containers. And further included in "canning" are subsequent operations, such as labeling and placing the sealed containers in cases.

In *Donnely v. Mavar Shrimp & Oyster Co.* (190 Fed., 2d, 409), the case involved a company engaged in canning, as well as other fishery operations. And the court affirmed that shuckers of oysters and cleaners of shrimp are exempt from the wage and hour law.

It said: "These appellants (employees) are not engaged in canning; they do not work in the canning room; they are engaged in a process involving shrimp and oysters that is different from, not necessarily related to, and often not succeeded by, canning."

Case 2—Guarantees on Price

Considerable discussion has arisen over the legal question: If a seller of food products gives the buyer a guarantee against price decline, how long is such a guarantee effective?

According to a late higher court decision the duration is only 90 days. Also, this court held that verbal agreements cannot vary a written guarantee made before the sale contract was signed.

For example, in *Henningsen v. Mayfair Co.* (253 Pac., 2d, 35) it was testified that one Griffin ordered five carloads of dried fruit from a seller. Later, Griffin stated that the seller gave him an unlimited guaranty against a decline in the invoice prices. The five carloads were shipped, and the first two carloads were promptly sold by Griffin. The last three, after being warehoused by Griffin, were slow in moving, but the invoices, aggregating $36,677.29, were promptly paid by Griffin. The alleged promised guaranty by the seller was not fulfilled.

In subsequent litigation, Griffin contended that the seller was liable on his oral, unlimited guarantee against price decline of the dried fruit, although several months had elapsed since the purchase.

It was then argued by the seller that although the written contract did not state the duration of its guarantee, yet there was no implication that the duration was unlimited, notwithstanding the alleged oral agreement. Griffin contended that the price-decline guarantee should continue as long as any of the dried fruit remained unsold on his floor.

The seller then testified and proved that by custom such guaranty period never ran beyond 90 days. And the lower court adopted this view and fixed the terminal date of the guarantee at three months after the contract was signed.

Hence, although Griffin contended that his total losses were as high as $17,000, the court's adoption of the 90-day period settled the amount of

(*Turn to page 135*)

¶ **Which workers come under the wage act?**

¶ **How long are guarantees against price decline effective?**

¶ **Just what does that "F.O.B." mean?**

¶ **How far back must proof of food purity go?**

¶ **When does reprocessing abolish insects?**

¶ **How should your records "work in reverse" to cover your company's insurance policy?**

¶ **When will the Supreme Court step into the picture?**

¶ **Can a warehouseman hold your goods to satisfy charges against withdrawn merchandise?**

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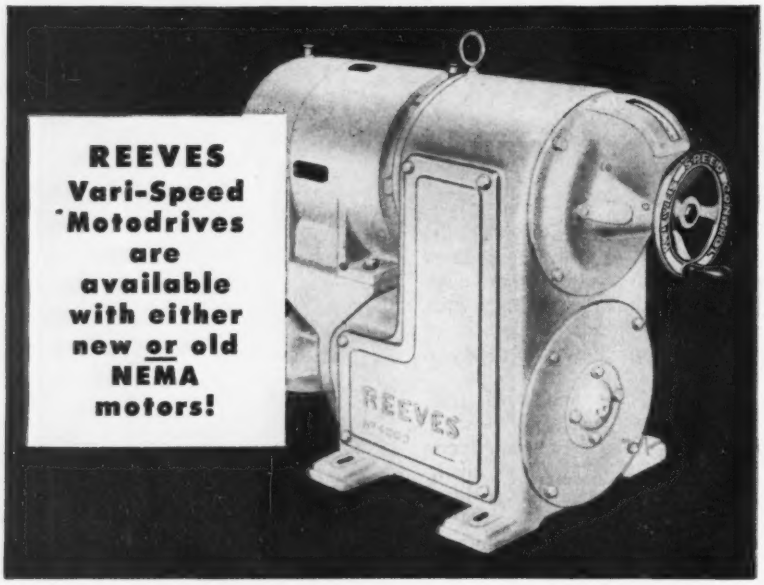

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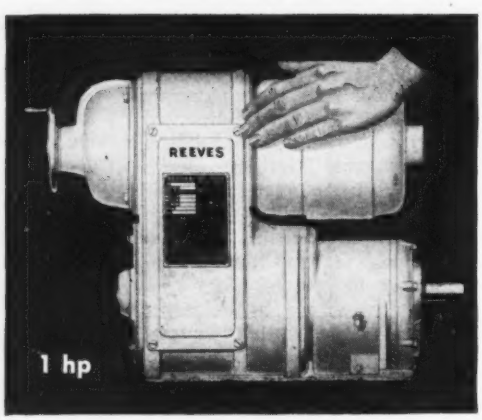

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Tomorrow's Food Plant

—*Continued from page 129*

ing costs and minimize maintenance.

Truck design and proper insulation is equally important. Automatic defrosting will be developed similar to that for home refrigerators. Central control systems will indicate that the trucks are on the line under refrigeration and that a unit has not dropped off due to overload, or burned out motor.

There are also certain equipment changes that will affect our future plant, such as the farm bulk-tank system. This will expand, to the practical elimination of cans and receiving rooms as they are known today. Plants will be engineered for rapid unloading of tank units.

Rectangular storage tanks will replace round ones to minimize floor space occupied. They will be cleaned in place, so to speak, and it will not be necessary for operators to enter the tanks for cleaning.

The future plant should have faster paper-bottle fillers for both factory and plant-made bottles. Automatic casers will be used, as well as case stackers properly located to reduce labor. Handling of cases in stacks to relays and wholesale trucks in a load-in-place operation will reduce manual labor.

Glass bottles will continue for retail sale for some time, but it would seem that the number of sizes and shapes will be reduced. Eventually, there should be a few large sizes, with the gallon and two quart on the increase.

Cottage Cheese Making

Changes in processing and handling, as well as the equipment design for cottage cheese production, have not kept pace with other phases of the field. Cooling of the curd should be improved and controlled as it is in other dairy products. It should be manufactured in a separate room. But for efficiency, the filling should be in the main bottling room. Cheese vat design needs study for more rapid draining, more sanitary agitators, and covers, and a general streamlining. Packaging should also improve into a faster, more fully automatic operation.

Fresh concentrated milk could very well become an important product in the future. In our new plants the product would require space for a vacuum pan installation, sufficient water for condenser, and perhaps boilers of a large capacity.

Sanitary piping systems will be more thoroughly engineered and the circuits simplified. Cleaning-in-place

will require that the sanitary piping systems be designed on paper before installation. Circuits will be studied for simplifying and routing to the central cleanup room, mentioned earlier. Proper rigid hanging of the sanitary pipes also will be essential.

The ice cream making room will house all processing equipment, storage tanks, pasteurizers, freezers, Popsicle tanks, etc. Packaging supplies will come from the central warehouse or directly from the basement.

Freezers of larger capacity will be designed, and storage tank capacities will be increased.

An improved hardening tunnel will be developed for packaged goods, and this operation will become continuous –direct from freezers to relays and trucks.

Automatic filling, packaging, and wrapping will increase in capacity as required by development of larger-size freezers.

Creation of new novelty equipment should be watched and investigated. Present equipment requires too much labor and occupies excessive space.

Meanwhile, we read about and visit the recently constructed plants and, although there is a great similarity between their equipment, there is not too much similarity in plant design. Perhaps this also will be true of plants in the future.

Above feature is from a talk, "Engineering the Dairy Plant of the Future," presented at the second Dairy Engineering Conference, Michigan State College, Mar. 3, 1954.

End (*Resume reading on page* 131)

8 Legal Decisions

—*Continued from page* 133

damages or refund due Griffin at $7,-593.11, the price decline during three months. The higher court specifically marked the fact that the writing contained nothing respecting duration of the guaranty.

The new higher court decision established at least two important points of law relating to sale contract law, namely: The courts will not listen to verbal testimony seeking to vary or render void a valid written guarantee; second, where a contract thus guarantees a purchaser on price, yet does not specify duration of the guarantee, the court will consider usual custom and so limit the guarantee.

Case 3—Meaning of "F.O.B."

Some confusion has arisen due to the fact that the term "F.O.B." sometime pops up in situations for which it was not intended. It originally had to do with carriage by sea—where "free on board" a given ship gave pretty clear indication of what the parties meant. When applied to rail transportation it loses some of its clarity. Hence, under varying circumstances the term F.O.B. may have a different legal meaning.

Take the case of *Seabrook Farms Co. v. Commodity Credit Corp.* (206 Fed., 2d, 93). Here, a seller and various buyers of peas had signed sales contracts whereon was printed "F.O.B. Cumberland Warehouse, Bridgeton, New Jersey."

Testimony detailed that the merchandise was stored in the warehouse in bins for the individual purchasers. In other words, Purchaser A's peas were put in a different bin from those of Purchaser B. The warehouse issued either negotiable or non-negotiable receipts at the buyer's request.

The lower court held that title to the peas had passed to the various purchasers upon their delivery to the warehouse. The higher court approved, saying that it "certainly would be extraordinary" if a warehouseman issued a negotiable warehouse merchandise receipt to a person who did not own the goods. "That", concluded the court, "would be an admirable way for the warehouseman to get into trouble, and the purchaser likewise."

Actually, the testimony showed

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How to Properly Evaluate the Cost of Fringe Benefits
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What's New at the Packaging Exposition—Picture Report
New Food Plant Engineered for Highest Efficiency

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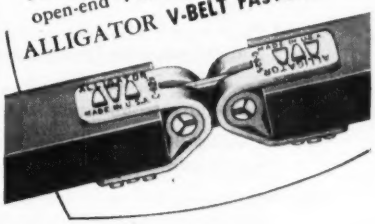

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Because of its extremely low pH, Oakite Bactericide begins its *killing action in 5 seconds.* Another important feature of Oakite Bactericide is its outstanding solubility. Fresh solutions can be made up in a matter of minutes. No need to make and store large stock solutions.

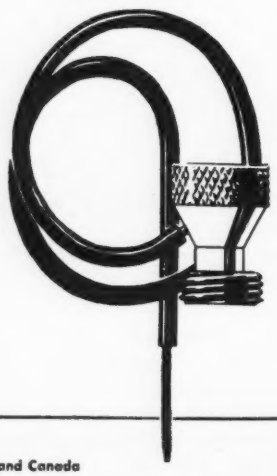
Many food plants are safeguarding taste-quality with Oakite Bactericide. For example:

- **Food Plant uses a 100 ppm solution on egg processing equipment. Like fast dissolving, non-streaking features.**
- **Dairy circulates 150 ppm solution through lines. Brought a troublesome bacteria count down.**
- **Bottler uses a 50 ppm solution in final spray of bottle washing. Gets sanitary, unclouded bottles.**
- **Brewery reports 200 ppm solution completely eliminates bacteria in heat exchangers.**

And here's something really new for Bactericide users: **It's a handy applicator called the Hozon Unit and it's free to users of Oakite Bactericide. *Here's how it works:***

Hook this unit up to any garden hose. Mix a concentrated solution of Oakite Bactericide in a bucket and place small Hozon tube in solution. Turn on hose and correct ppm solution of Oakite Bactericide is discharged from the hose's nozzle. Makes sanitizing large areas and hard to reach corners a simple and fast operation.

For more details on Oakite Bactericide and the Hozon Unit, see your Oakite Representative. If you prefer to write direct, we'll be happy to send complete details. Address: Oakite Products, Inc., 26G Rector Street, New York 6, N. Y.



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that the peas were to be repacked by the seller upon later demand of purchaser. In this respect, the higher court pointed out that where there is a contract to sell specific goods and the seller is bound to do something to the goods (putting them into a desired deliverable state), the title usually does not pass until such thing is done. In this case, however, the court said:

"We have no doubt that the parties intended this delivery to be the transfer of title by the seller to the buyer of the peas." To support the conclusion, we do not have to depend upon the term "F.O.B. Cumberland Warehouse" alone.

Case 4—Pre-Adulteration

Another question: "In what way, if any, does the Federal Pure Food laws cover such commodities as coffee, tea, etc.?"

A recent higher court, having held that green coffee beans, being components of food, are subject to condemnation, went on to declare that a food may be condemned as adulterated even though later, after it is prepared and ready for sale, it will not be adulterated.

The case *United v. Bayer & Co.* (188 Fed. Rep., 2d, 555), concerned condemnation and seizure of 253 bags of green coffee beans testified as being mixed with wood splinters, floor sweepings, etc.

Defense contended that the green beans were not a food within the meaning of the law; also that the floor was relatively clean and free from germs, and so the coffee beans were not adulterated; and further that the foreign matter would be eliminated by the subsequent roasting process.

But the higher court upheld the seizure, saying that green coffee fulfilled the statutory definition of food, and when adulterated may be condemned even though there is intention to eliminate the adulteration by a future process.

Case 5—Processing Adulterants

Further in the matter of eliminating adulteration of food by processing, a recent higher court held that although reprocessing will abolish adulteration from some products, it cannot remove insects, mites, etc., from all food products.

This case (*United States*, 165 Fed., 2d, 728), concerned seizure of three shipments of butter owned by the Bowse Sales & Trading Corp. The Federal agents proved that the butter was adulterated because it consisted "in part of filthy substances", such as insects and mites. After being fil-

Why the big surge in low calorie foods?

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Here's your new market—36,000,000 overweight and diabetics—people who won't (or can't) eat regular sugar-sweetened foods.

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What's in it for YOU? A bigger-than-ever market for dietetic products... with volume going up and up every month. You can sell this market now. Write today for further information to Chemical Sales Division, Abbott Laboratories, North Chicago, Illinois.

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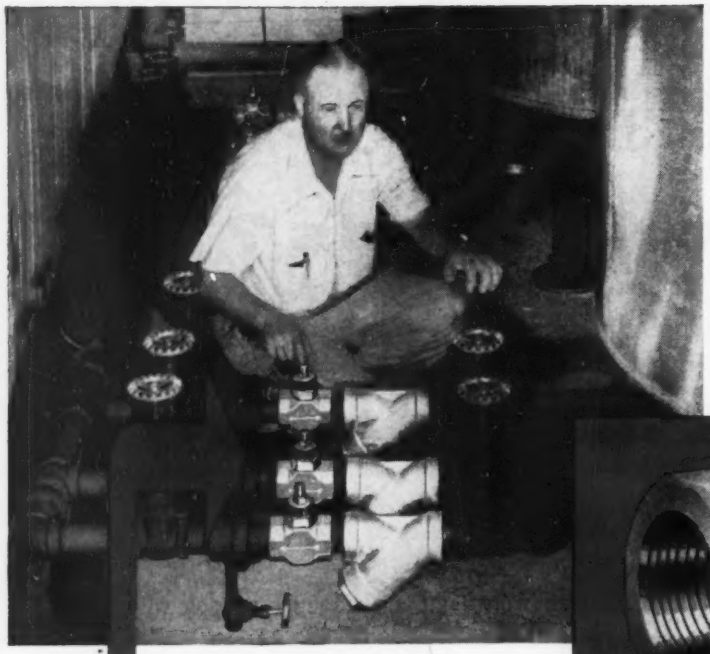

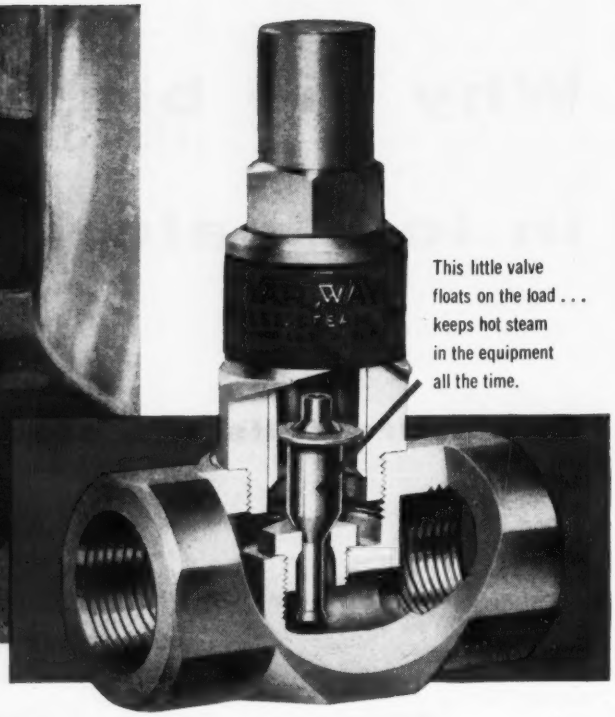

This little valve floats on the load . . . keeps hot steam in the equipment all the time.

THESE STEAM TRAPS GIVE FASTER HEAT-UP ON TOMATO COOKERS *PLUS 5 EXTRA BATCHES PER DAY!*

RIPE tomatoes can't wait and they don't have to at the P.M.C. Canning Company, Swedesboro, New Jersey.

The owner of this large tomato and pizza sauce cannery found that by switching to YARWAY Impulse Steam Traps on his 1500 gallon cooking kettles, he was able to speed up the heat-up period enough to give *5 to 6 extra batches per day*. In addition, only with YARWAYS could high boiling temperatures be obtained quickly enough for proper pizza sauce processing.

That's because the little stainless steel valve (the only moving part in a YARWAY trap) opens wide when steam is turned on and discharges air and condensate *continuously* until production temperature is reached. After that, by a pulsating action, each tiny bit of condensate is discharged as it forms—maintaining steady, maximum temperature in the equipment.

This makes for profitable steam trapping. So do these other YARWAY advantages—low initial cost, low maintenance, stainless steel construction, easy close-quarter installation, quick availability from more than 200 local industrial distributors.

Try a YARWAY Impulse Trap FREE for 60 days in your plant. It's the best test. Your distributor will supply the trap. For his name, write . . .

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YARWAY

the steam trap designed with more production in mind

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tered, these substances were to a great degree removed. But the lower court held that the butter was adulterated and refused to authorize the processor to sell it.

Here, several experts testified that insects and mites contain fatty and oily substances that tend to dissolve into the fat of cream and butter. The higher court affirmed the decision of the lower court, and stated:

"It was for the District Court to say whether the claimant should be allowed to reprocess the butter and offer it to the public as fit for human consumption. The jury made a finding of filth in the butter, and since soluble insect parts could not be removed by the processing method it must be satisfied that the filth was present in a substantial degree."

However, in *Anderson v. United States* (284 Fed. 542) the court held that adulteration sometimes may be so slight that the food isn't legally adulterated.

Case 6—Insurance Violations

"Give special protection to your records" is the moral of another case. Here, a higher court decided that a food company which keeps records in such manner that they are likely to be destroyed or stolen violates an insurance policy — thus forfeiting its right to collect in event of a loss.

The illustration is *Ever Krisp Food Products Co. v. New Amsterdam* (61 N. W., 2d, 172), where the former held a burglary insurance policy specifying that it should keep its records in a manner whereby the insurance company accurately could determine the amount of any loss.

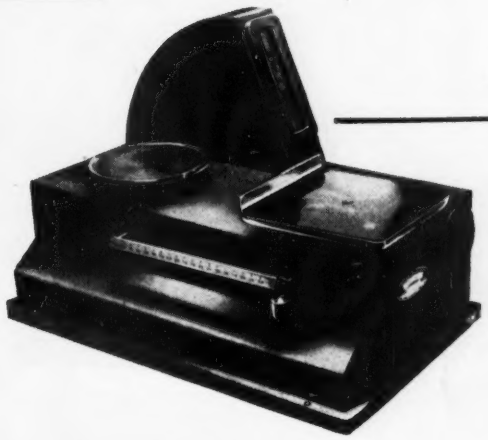
Testimony showed that the food company kept in its safe envelopes of money belonging to its employees, and made notations on these envelopes as to the amount of money they contained.

In subsequent litigation, the higher court held that these notations did not constitute a proper record as specified in the policy. The court said that the company should have anticipated that if the money were wrongfully taken from the safe then it was to be expected that the envelopes would be taken with it, so that no record would remain.

Further, said the court, an insured company does not comply with such requirements of an insurance policy if it permits its records to remain vulnerable.

Case 7—State Court Comes First

Under what circumstances will the Supreme Court of the United States



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SHADOGRAPH's shadow-edge indication is projected by a beam of light, eliminating all friction of indicating mechanism and increasing visible accuracy over 300%. Greater speed is achieved through reduction of lever movement and by the action of an adjustable damping device. Parallax readings are impossible. Available in capacities and sensitivities for every manual food packaging or checkweighing operation. Model shown has capacity of six pounds and sensitivity of 1/80 ounce. Other SHADOGRAPH models with capacities to 75 pounds. Send coupon for complete information.

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Aluminum foil food container enters machine automatically.

Note automatic placement of board cover over food tray.

Package is overwrapped with foil-laminated sheet... Presto! Automatic, attractive packaging of frozen food the Hayssen Way.

See how the
HAYSSEN WRAPPING MACHINE
wraps *your* frozen food products!

Completely *automatic* handling of the new Reynolds Wrap-Pak was solved when Hayssen perfected the "3-in-1" packaging method for this premium quality frozen food package. Use of a cover over the tray posed the problem. Formerly requiring a hand operation, Hayssen engineers worked with Reynolds to devise an easy, automatic method for placement of the cover before overwrapping the package with foil. *The superior qualities of the aluminum foil package are now matched by its lowered packaging cost.*

Be sure to visit the Reynolds packaging show when it rolls your way. You'll see how to get spectacular packaging savings with a Hayssen automatic machine ... up to 500% over hand methods on some products. What's more, you'll see how to get a neat, tight package with unmatched eye-appeal that swings the buy-decision to your product every time. *Write for more information.*

IT PAYS TO WRAP THE HAYSSEN WAY

Hayssen MFG. COMPANY

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Since 1910, One of the World's Largest Manufacturers of Wrapping Machines for: PAPER • TEXTILES • BAKED GOODS • VEGETABLES • FROZEN FOODS CANDY • ICE CREAM • DAIRY • MEATS • IRREGULAR SHAPES

weigh the validity of a restrictive food law of a State?

Here, the Supreme Court has held that a State court must first decide whether such a law is valid.

The declaration came in *Shipman v. Du Pre* (70 S. Ct. 641), where one Shipman had filed a suit in the U. S. District court asking for a judgment that certain laws of South Carolina regulating fisheries and shrimping operations were unconstitutional.

Concluding the Supreme Court's decision was this statement: "From the papers submitted on appeal, it does not appear that the statutory sections in question have as yet been construed by the state courts. We are therefore of the opinion that the District Court erred in disposing of the complaint on the merits."

Case 8—Validity of Storage Liens

There's also been considerable controversy on this quetsion: "Has a warehouseman a valid lien on presently stored goods to secure payment of storage charges on merchandise previously removed from the warehouse?"

This question was answered by a higher court in the recent case of *Milford Packing Co.* (90 Atl., 2d, 796). It was testified that Milford purchased raw cucumbers and processed them as dills in barrels. The methods, it was pointed out, involve a partial fermentation followed by cold-storage warehousing to arrest further fermentation until the pickles are ready for marketing.

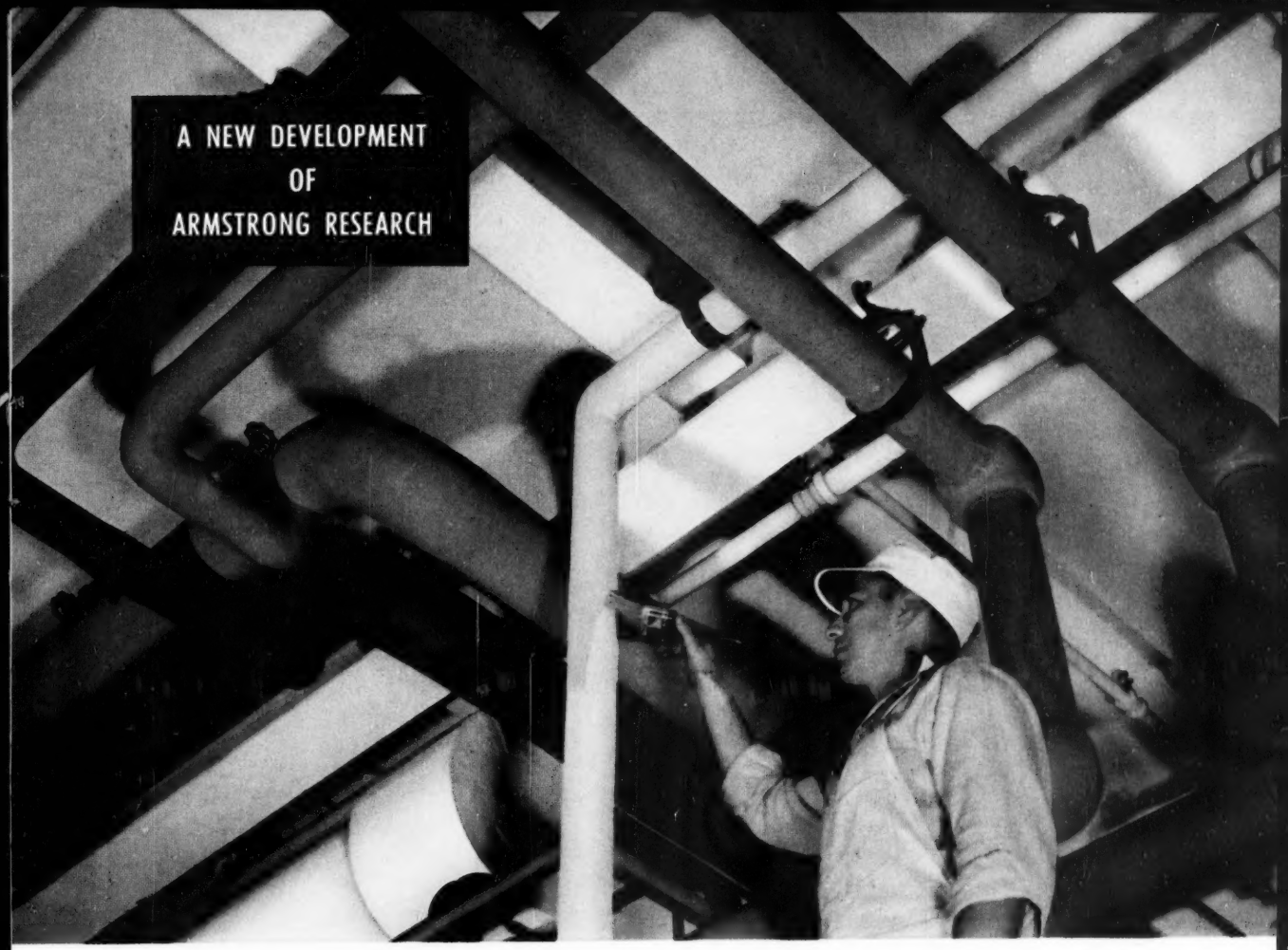
During July and August, the company delivered 2,488 barrels of pickles to a warehouseman for cold storage, and the latter issued non-negotiable warehouse receipts for them.

In the period from December 1 to April 27, the packing company withdrew 1,894 barrels of pickles from the warehouse. Then on April 27, the warehouseman demanded payment of all storage charges then due, including charges on the barrels already withdrawn.

The packing company would not comply, whereupon the warehouseman refused to permit further withdrawals from the 594 barrels remaining.

Upshot was that the higher court refused to hold, under the Warehouse Receipts Act, that the warehouseman had a general lien on the 594 barrels to secure payment of overdue storage charges on those earlier-withdrawn.

Furthering favoring the packer was an additional aspect: The warehouseman was to have stored the pickles at a temperature of not less than 32 deg. F. But testimony showed that of the 1,894 bbl. withdrawn, 300 were



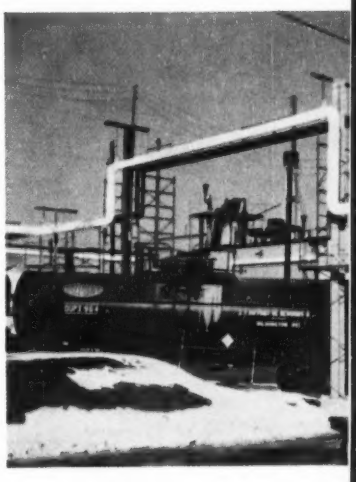
Insulcolor . . . *a new plastic finish for insulated lines, tanks, ducts, and cold rooms*

Here's a new kind of insulation finish that also serves as color identification. It's Armstrong's Insulcolor, a newly developed plastic coating for use on high- and low-temperature installations in either indoor or outdoor locations.

Armstrong's Insulcolor dries to a smooth, attractive finish that is rugged and durable. It will withstand a wide range of temperatures without cracking or crazing. Insulcolor is both fire and moisture resistant, easy to maintain.

It is quickly and easily applied, eliminating many of the steps required with standard finishing methods. Available in a choice of seven colors and white, Armstrong's Insulcolor cuts the expense of additional painting of insulation surfaces for identification or decoration.

Insulcolor is another example of ways Armstrong's research is developing insulation materials and methods that simplify application, reduce costs. For full details on Insulcolor and Armstrong's Complete Contract Service, call your nearest Armstrong office or write Armstrong Cork Company, 201 Stratton St., Lancaster, Pennsylvania.



Insulcolor's rugged properties give it the durability needed to withstand severe outdoor service. In the photo above, white Insulcolor has been applied to an overhead line at one of the plants of E. I. du Pont de Nemours and Company, Inc.

ARMSTRONG'S INDUSTRIAL INSULATIONS

Here's a new form of **Myverol Distilled Monoglycerides**

These tiny beads are Myverol® Distilled Monoglycerides, Type 18-00.

This is a beaded form which we developed for ice cream manufacturers and others who find that monoglycerides disperse better this way. Perhaps this form is more suitable for your product or process than the flake or plastic fat form of distilled monoglycerides.

We produce Myverol Distilled Monoglycerides from natural fats and oils and concentrate them by a unique molecular distillation process to a high monoglyceride content. The result is a product that is a safe, wholesome food, as well as an efficient emulsifier. And you can rely on its uniformity from batch to batch.

The best way to find out how Myverol Distilled Monoglycerides can help improve your product is to try it in your own plant. If you'll get in touch with us, we'll be happy to recommend a type and form of Myverol Distilled Monoglycerides for your needs—supply a generous sample for test, too. Write to ***Distillation Products Industries,*** Rochester 3, N. Y. Sales offices: New York and Chicago • W. M. Gillies and Company, Los Angeles and San Francisco • Charles Albert Smith Limited, Montreal and Toronto.

distillers of monoglycerides made from natural fats and oils

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frozen while in the "care, custody, and control" of the warehouseman.

This freezing was blamed on failure of the warehouseman to store the goods at proper temperature, defective storage-room insulation being specifically cited.

In view of this, the court held the warehouseman liable for full original value of the pickles, saying:

"The defendant (warehouseman) knew, or should have known, of the defective insulation. As for the 300 barrels of frozen pickles, he failed to exercise the care which a reasonably careful owner of similar goods would have exercised."

End (Resume reading on page 144)

5-Yr. Modernization

—*Continued from page 98*

dling methods to reduce unit cost per case.

9. Installation of streamlined methods of canned-goods order assembling, labeling, and casing.

In the meantime, the fresh fruit operations will require additional cold storage facilities, as well as many improvements in methods of the packing houses.

All told, the first year of AGA's progressive 5-yr. program has been notable in marking completion of improvements on the preliminary operations—to supply the cannery with raw materials from pear receiving to the point where ripened pears are delivered to the pear-peeling machines.

Operations concerned in these changes have involved but 10% of the total cannery labor force. Actual savings have been offset by wage increases and a smaller 1953 crop.

Cannery crops of apples, peaches, and cherries are not forgotten in the planning. They are processed prior to the pear pack, therefore can utilize the storage space in pear-ripening rooms and between the preparation lines. Improved methods are planned for them, too.

It's calculated that these 1953 changes in the cannery will, in 1957, bring a net reduction of 34% in man-hours per ton, while at the same time increasing employment 29%. The larger and more effective improvements in cannery methods, aiming at notable cost reductions, have not yet been touched. Most efforts in '53 had to be devoted to building construction to provide adequate operational space.

During this first year, many improvements also have been made in the fresh fruit packing houses. Plans are also laid for their expansion.

End (Resume reading on page 99)

Quickly set—holds temperature constant

Here's a proved way to modernize and *save* on your processing operations. With this dependable Sylphon Regulator, you can make quick changes in temperatures for liquids, air or gases. Simple turn of the crank adjusts the temperature to the setting desired. Ideal for applications requiring frequent temperature changes to suit processing stages.

More advantages! You are assured of uniform processing conditions. Spoilage is reduced. Wasteful overheating is prevented. You save manpower, man hours and fuel.

Sylphon Regulator No. 923-Q has many uses: with open and closed tanks, bottle washers, glue kettles, dishwashing machines, slashers and other units. Sturdily built for years of trouble-free service. Recommended as standard equipment. Write for information. Or, ask about a Sylphon Control for *your* specific operations. Send for Catalog GG-D.

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NEW PACKAGES & PRODUCTS

Lent Sparks Growing Popularity of Frozen Seafood

Already boosted by popularity of prepared frozen foods, frozen seafood products have gained an added lift during the Lenten season. A variety of products and packages is to be seen riding the crest of the wave.

Wide variety of specialties are being marketed by Spruce Head Kitchens, Rockland, Me., taking full advantage of aluminum foil packaging. Packed in foil boxes are creamed finnan haddie, lobster Newburg, creamed haddock, lobster bisque, and lobster chowder. Another item, lobster thermidor, is packed in a rectangular carton overwrapped with cellophane. Label is placed beneath overwrap.

Featuring the "heat and eat" directions prominently on their labels, the Spruce Head products all contain the reproduction of a Maine fisherman, emphasizing the connection with the Maine seafood industry. Foil packages have crimped covers. The lobster thermidor carton is opened by a flap at one end.

Clam chowder is available in either cup or can. Morgan's Old Fashioned clam chowder is offered in a bright white can illustrated with full-rigged ship. Packed by Beaver Brands Frozen Foods, Inc., New York, the 12-oz. can guarantees freshness and ease in handling.

Teddy's brand clam chowder, distributed by House of Seafood Inc., New York, is marketed in a cardboard cup, also illustrated with a ship under full sail. This chowder is also processed and packed by Beaver Brands Frozen Foods, Inc.

Another in the heat and serve product line being marketed under the Teddy's label is New England style creamed codfish pie. Packed in a foil pie plate, product is then placed in a carton overwrapped with waxed paper. An attractive and colorful label illustrates contents.

Shrimp in Cans

Newest in the frozen seafood market is frozen shrimp, processed by John H. Dulany & Son, Fruitland, Md. Reported as the first instance of frozen shrimp canning, the product was developed by the processor in collaboration with Continental Can Co. The canned shrimp offers the advantage of practically no dehydration, a problem in standard paper packaging of shrimp.

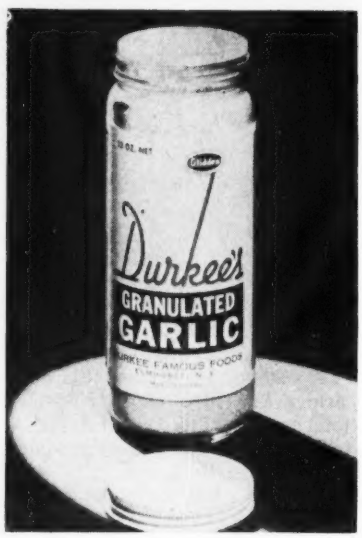
Ready to serve, the product is said to have a longer shelf life than paper packaged shrimp. Cleaned, cooked, and seasoned before packing, the shrimp may be served cold or heated. The can is attractively lithographed in four colors, presenting identification and a reproduction of the contents.

New Bacon Pack

Marathon Corp., Menasha, Wis., has gained wide acceptance of its "Bacon-Saver" package. Offering a large area for design and sales message in addition to a cellophane window, the low cost package permits easy stacking. An arrow-style lock furnishes positive closure, and eliminates side movement of the lock panel. An extra attraction is a high gloss wax coating inside and outside.

Reported as the first package to combine a transparent window with inside gloss waxing, the package is filled manually, and is therefore most suitable for the small volume processor.

For Package Data Use Reader Service, p. 175



Institutional Seasonings

Designed to make the chef's life more bearable are three institutional seasoning products processed by Durkee Famous Foods, Elmhurst, N. Y. Granulated onion and granulated garlic are packaged in reusable tall 10- and 12-oz. jars with colorful labels and a removable plastic sifter tops. The condiments consist of tiny granules of pure dehydrated vegetables.

A companion item is Durkee's meat tenderizer, packed in a 1-lb. metal reinforced cardboard carton. The product contains salt, dextrose, papaya enzyme, spices, and magnesium stearate. Feature of the package is that entire top may be removed, as well as the cap over the pouring well.

PROTECTED by Riegel

NEW MANISCHEWITZ MATZO PACKAGE CONTAINS FOUR 1¼ LB. UNITS PRE-WRAPPED ON A BATTLE CREEK MACHINE WITH A SPECIAL RIEGEL LAMINATED GLASSINE, OVER-WAXED FOR HEAT SEALING.

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Somewhere among this wide selection you may find a better or more economical paper to protect your product. If we don't have just what you want, we can usually "tailor-make" a new paper to your specifications.

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AN EXPLANATION

In answer to increased interest in a recently inaugurated procedure for conducting "on-the-spot" demonstrations of air-flotation equipment, we are pleased to make the following explanation.

The advent of our lab-size Whippet V-80 Separator makes it possible to establish, in your own plant and at your convenience, accurate forecasts of results which will be obtained from the identical process under full-scale operating conditions.

Such a demonstration may be of invaluable aid to that phase of your research program which involves the economy of operations and the quality of raw or end products. Perhaps the V-80 will indicate an immediate usefulness. Seeing is believing.

Your move is simple. Write to the department and address below. Tell us that you want to see the results of separations made by effecting differences in specific gravity through air-flotation . . . under *your* actual operating conditions, rather than in a catalog. We'll take it from there.

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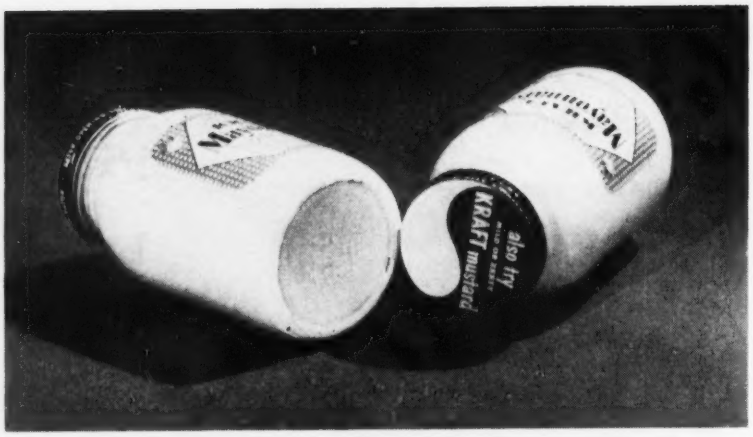


New Shelf Stacking Jars Aid Handling

Kraft Foods Co. is converting its full line of wide-mouth jar packaged products to new shelf-stacking, interlocking jar caps and bases.

Designed to solve the problem of shelf stacking of jar packaged products, the changeover lends itself to more orderly and neater shelf display, and better product identification. The ridged jar cap and indented jar base, one interlocking into the other, was proved as the solution to shelving jars in two and three tiers neatly and quickly.

The processor has plans to incorporate the feature in other products where the shelf stacking feature would aid handling.

Secret Sauce Available

Lamaze sauce, a world famous recipe kept secret for many years, is now being bottled and distributed by Silver Bell Foods Corp., a newly formed Philadelphia processor.

Specially noted as a sauce for shrimp, the product was originally developed for the Warwick Hotel in Philadelphia, by the late George Lamaze. To preserve quality of the sauce, Silver Bell Foods reports that a special process was developed which guarantees that the sauce will keep a minimum of six months without refrigeration. Involving no artificial preservatives, the process and quantities of each ingredient are being kept secret.

The sauce is being marketed in an 8-oz. jar featuring a cellophane inner seal beneath the cap to keep out air and moisture.

Chili, Paprika, in Cans

In a move toward convenient handling of its institutional packages of chili powder, paprika, and other seasonings, Gentry, a division of Consolidated Grocers Corp., Los Angeles, has switched its 1-lb. packs from fiber-walled containers to friction top cylin-

drical tins. Lower in height and wider than the former container, the can features an open top, enabling users to dip into contents with a spoon or other measuring device. Label is lithographed in color.

Ready-to-Roast Wrap

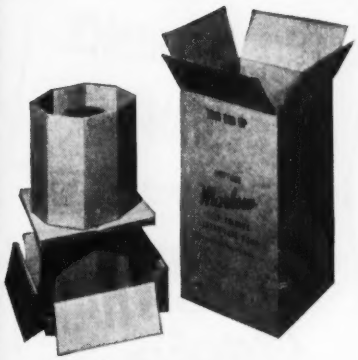
Produced by Milprint, Inc., Milwaukee, a wrapper of extra-heavy aluminum foil is being used for California Turkey Growers Association of San Francisco's line of frozen turkeys. Printed in royal blue and white, the feature of the wrap is that it permits the turkey to be roasted as it is purchased. The brand name, Roast-R-Wrapt emphasizes this convenient feature. Instructions for roasting are given on the wrap, below a reproduction of a roasted bird. Providing excellent protection for the product, the foil also has great sales appeal.

For Package Data Use Reader Service, p. 175

Shoe-Peg Type Corn

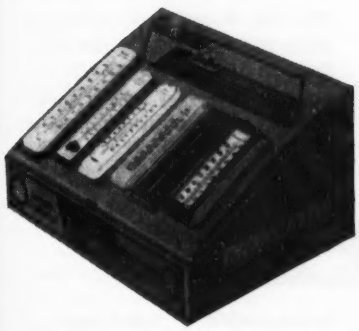
Vacuum packed young whole-kernel corn is being packed in shoe peg style by Green Giant Co., Le Sueur, Minn., under the Le Sueur label. Much smaller than ordinary corn, the kernels are packed in a can with an attractive foil label.

ECONOMICAL
PROTECTION



PROMINENT
IDENTIFICATION

SALES-WINNING
PROMOTION



Write for booklet,
"How To Merchandise With
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Hinde & Dauch, Sandusky
11, Ohio.

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Packaging on Packaging

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Complete Plant In One Machine!

- Lowest cost per unit
- Greatest product protection
- Completely automatic
- Attractive packages
- Flexible packages—Fin & Pillow types

3 basic machines

MODEL A—for smaller units with high production rates.
Pkg. Sizes: ¾" x 2" to 2⅜" x 6"

MODEL B—general purpose packaging machines for most jobs.
Pkg. Sizes: 1¾" x 2" to 5¼" x 12"

MODEL C—makes larger packages—and handles straight poly film.
Pkg. Sizes: up to 9½" x 14"

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HANDLES ANY PRODUCT IN THIS FULL RANGE OF FLEXIBLE PACKAGING MATERIALS

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TRANSWRAP is a complete packaging plant in itself. It is a completely automatic operation giving you attractive, hermetically sealed packages at lowest possible unit cost. Investigate TRANSWRAP before you standardize on a packaging setup. A complete brochure of TRANSWRAP equipment is available, upon request. Contact us today!

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HASBROUCK HEIGHTS, N. J.
Sales and Service in all principal cities of U. S. plus Canada, Mexico, South America & Europe

Readymade Pie Fillings

C. H. Musselman Co., Biglerville, Pa., is offering the consumer readymade pie fillings in cherry and apple flavors. Packed in 1-lb., 1-oz. glass jars, the products are marketed under the Applpie and Cherripie labels in Musselman's Pennsylvania Dutch line. Apple juice, apple sauce, and jellies, are also distributed under the Pennsylvania Dutch identification.

A vacuum cap by Anchor Hocking seals the jar, distinguished by high and narrow shoulders. Label includes a recipe for pie and other suggestions.

Ingredients include fruit, sugar, starch, fruit acid, and color in the case of the Cherripie filling.

New Vegetable Juice Blend

"Vegamato", a new blend of fresh vegetable juices, has been introduced by B. Meier & Son, Inc., New York. A mixture of tomato, carrot, celery, spinach, parsley, beets, and sweet green peppers, the product contains none of the seasonings common to vegetable juice cocktail, though lemon juice is added to add flavor.

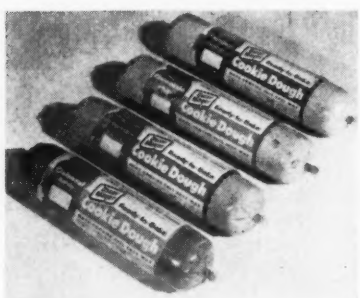
Packaged in 5½, 12, and 46-oz. cans, Vegamato may be served either hot or chilled.

Passover Sponge Cake

Premixed except for the addition of eggs, Passover Sponge Cake Mix is a new product of Horowitz Brothers and Margareten, Long Island City. Made to conform to strict dietary laws, the mix is packaged in an attractive 12-oz. carton made by Rossotti Lithograph Corp., North Bergen, N. J.

Requiring only eggs and water, product contains sugar, matzoh cake meal, and potato starch. Label contains identification, a reproduction of a sponge cake, and indication that the product is made under strict orthodox rabbinical supervision.

For Package Data Use Reader Service, p. 175



Ready-to-Bake Dough

Oscar Mayer & Co., Madison, Wis., is processing ready-to-bake cookie dough packaged in a Saran-film bag. Offered in chocolate chip, vanilla, peanut butter, and oatmeal raisin, the cookies are not frozen when shipped, but may be frozen by consumer. The cookie dough is, however, shipped and stored under refrigeration.

Chief selling point of the product is convenience for the consumer, since

the housewife avoids mixing problems and saves time. Package is airtight, giving the dough a longer shelf life. Ingredients include new bland shortenings, super-fine sugar and brown sugar.

Processor plans additional varieties of cookie mix to meet consumer requirements and taste.

Potted and Canned

Trenton Food, Inc., Kansas City, Mo., is marketing its Dinner Time beef pot pie in a flat, lidded 1-lb., 1-oz., can. Shaped and lithographed to represent the actual pie, the can top has identification while the bottom reveals instructions for preparation. Completely enclosed in pie dough, pie is heated with lid removed, then served.

New Product Shorts

More Eye Appeal—Less Space

Taking up a third less shelf space and yet offering 100% more eye appeal is Terry Foods, Inc.'s new frozen food products. Packages, replacing a round waxed tub, the Park Ridge, Ill., processor is now using cellophane-overwrapped rectangular boxes designed by Milprint Inc., Milwaukee.

Meals in a Hurry

Armour and Company has introduced beef grill steaks in its frozen meat line. Made from chopped beef, molded sliced and cubed, steaks are packed three to an 8-oz. package.

How to Pull a Rabbit Out of a Freezer

H. F. Pelphrey & Son, Los Angeles, is processing frozen rabbit under the Pel-Freez label, in both roasting and frying styles.

Shelf Impact Plus

Both 4- and 8-oz. jars of Instant Postum have been decorated with a new, blue and white label printed on aluminum foil. Jar has also been redesigned. Object is added "shelf impact".

Triple Protection

Chesty Foods, Inc., Terre Haute, has improved shelf life of potato chip line through triple overwrapping. Chips are packed in two specially treated waxed bags, then placed in a carton which is wrapped with cellophane overwrap.

Carryover represents an economic loss to your plant. Scientifically engineered Hi-eF Purifiers prevent this loss . . . stop carryover from leaving evaporators, concentrators, stills and similar equipment. Installed inside the vessel or in the line near it, Hi-eF Purifiers recover 99% of all solids from vapors and gases which:

1. **Permit process vessels to be operated at greater capacities.**
2. **Prevent valuable solids from leaving the process vessel.**
3. **Stop contamination of subsequent processes with guck, solids, etc.**
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5. **Increase operating efficiency of process equipment.**

Designed by America's leading separator engineers, Hi-eF Purifiers are unequalled in their efficiency. They are stationary, maintenance-free and filterless, and embody new multi-stage baffle and centrifugal separation design. Mail coupon for further details.

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For more information, use coupon on page 175.

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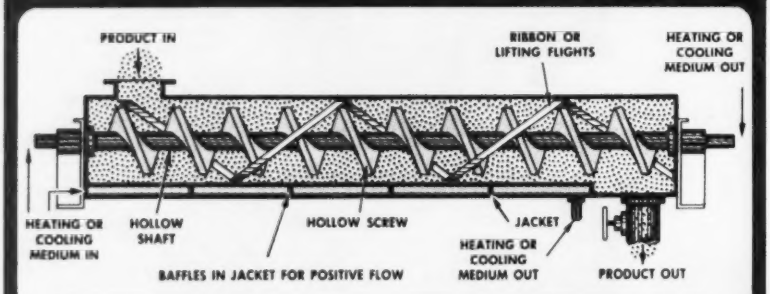

Drawing illustrating operating principles of continuous Thermascrew with external mixing ribbon. Dotted portion shows product; gray shows heated or cooled surfaces.

Even mixing and conveying action makes Thermascrew continuous processing efficient, uniform and *product-protective*. Hollow screw and shaft and jacketed trough provide maximum heat transfer surfaces against which product is constantly tumbled in gentle mixing action. Burning, sticking, breaking, crushing, abrading, dusting, etc. held to a minimum. No wonder new uses for Thermascrews are being discovered each month!

Economical! Automatic Rietz Thermascrews operate continuously, with minimum labor. Can be quickly, easily cleaned. Compact.

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- Cooking
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- Drying
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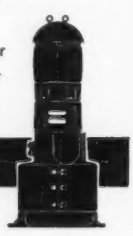
- Mixing
- Solvent Extraction

You can use Thermascrews on a *variety* of products, including many which cannot be processed in other conventional heat exchange equipment.

Write for new Bulletin No. T-506, Rietz Thermascrews

LABORATORY TESTING of your product at our expense or PILOT PLANT-SIZE EQUIPMENT for use in your plant. Write for complete details.



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Technical Man

—Continued from page 67

nically trained person becomes useful to his company only when he is in a position to make a constructive contribution.

All Pull Together

From an administrative standpoint, the technical department should fit in with purchases, production, and sales,—with management acting as the coordinating force.

Materials purchased for use in the end-product should be checked and approved by the laboratory before the purchase is confirmed. Production-wise, uniformity of product can be maintained through periodic examination at the critical points of the operation. Information attained here should be passed on to the production supervisor.

A valuable contribution can be made to the sales department through technical investigation of consumer acceptance or complaints. The sales department can gain through contact with the laboratory by being more fully informed on the product it is attempting to sell. By the same token, all departments of the business can benefit if competitive products are compared and a realistic evaluation of observations is jointly discussed.

This should lead to interdepartmental conferences. If constructively carried out, such conferences can result in development programs for improvement either of the product or the method of production. A development program of this nature can be classified as research.

Research may become involved if all aspects of a problem are not fully considered. A research project suggested for study and solution may be basic or of common interest to competitive companies in a particular field of the food industry. In either case, the investigation might best be carried out by either an association laboratory connected with the industry or by a university.

Where in-plant research is concerned, it would be inadvisable to start a project until mutual agreement is first reached that a direct improvement or other form of advantage may be gained as a result of the undertaking.

Around Conference Table

A committee composed of management, production, and research should develop a prospectus encompassing such items as approximate cost, man-

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Found in nature as a sweet, nutritive ingredient of many edible fruits and berries, sorbitol is now available from Atlas in mass production quantities. It is made by the hydrogenation of corn, cane and beet sugars.

Food technologists have found that sorbitol improves the quality of many food products, through its ability to improve storage life by stabilizing moisture and retaining softness. The established nutritive value of sorbitol, its non-volatility and mild, sweet taste also add to its preference as a food ingredient.

Sorbitol is supplied in two convenient forms for food use: SORBO® (70% solution) and crystalline powder or pellets. For samples and technical information, write to Atlas today.

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YOU SAVE TIME WITH GREATER SAFETY

That's because new Chevrolet trucks permit you to maintain faster schedules *without* driving at higher maximum road speeds. Thanks to greatly increased acceleration and hill-climbing ability, you can save time where it counts. Instead of trying to make up for lost time, you actually cut down the time lost at traffic lights and on steep grades.

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New Chevrolet trucks bring you high-compression power that saves you money every mile. All three great engines—the "Thriftmaster 235," the "Loadmaster 235" and the "Jobmaster 261"* deliver greater horsepower *plus* increased operating economy. In addition, the mighty "Jobmaster 261" engine reduces the need for operating in low gears on heavy-duty jobs. As a result, you shift gears less . . . save more on gas.

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THREE GREAT ENGINES—The new "Jobmaster 261" engine* for extra heavy hauling. The "Thriftmaster 235" or "Loadmaster 235" for light-, medium- and heavy-duty hauling. **NEW TRUCK HYDRA-MATIC TRANSMISSION***—offered on ½-, ¾- and 1-ton models. Heavy-Duty **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **DIAPHRAGM SPRING CLUTCH**—improved-action engagement. **HYPOID REAR AXLE**—for longer life on all models. **TORQUE-ACTION BRAKES**—on all wheels on light- and medium-duty models. **TWIN-ACTION REAR WHEEL BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—greater holding ability on heavy-duty models. **NEW RIDE CONTROL SEAT***—eliminates backrubbing. **NEW, LARGER UNIT-DESIGNED PICKUP AND PLATFORM STAKE BODIES**—give increased load space. **COMFORTMASTER CAB**—offers greater comfort, convenience and safety. **PANORAMIC WINDSHIELD**—for increased driver vision. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—easier, safer handling. **ADVANCE-DESIGN STYLING**—rugged, handsome appearance.

**Optional at extra cost. Ride Control Seat is available on all cab models, "Jobmaster 261" engine on 2-ton models, truck Hydra-Matic transmission on ½-, ¾- and 1-ton models.*

hours, and equipment necessary to carry the project to completion. Obviously, such a prospectus will be relative, but it will serve to confirm whether or not the undertaking is justified.

Conferences should take place as the various phases of the project become manifest, since free exchange of ideas not only may suggest a simpler approach or solution but also will engender a bond of mutual interests and responsibilities.

Moreover, progress reports or interdepartmental correspondence will be obviated through discussion and clarification of the information thus far accumulated. As all interested parties are continuously and fully advised, joint decisions may be reached more readily as to when the project has reached the stage where line production is justified. And it is a great satisfaction when this takes place.

Key To Greater Progress

It is only through teamwork—free exchange of ideas and creation of individual enthusiasm and incentive—that greater progress can be made and put into practice. One idea often leads to another. If properly stimulated, such teamwork can be carried to a point where self-discipline is imposed by the workers themselves.

With the approach of more conservative tendencies, and as competitive items become more common, combined resourcefulness and research are all the more necessary to produce a commodity which will entice the consumer.

When the potential of the technician and his department become more evident, his department may be used as a training ground for personnel to be absorbed in other phases of the business.

Above All—Ethics

There is one other item of common interest applying with equal force to both company and individual. This is moral and intellectual honesty as it concerns conduct in human relationships. It is usually defined as ethics.

Much could be written about this. But suffice it to say that there is no better way to create dissension than through unethical practices for the sake of gaining some form of personal advantage.

Moral progress should go hand in hand with material progress. Both the company and the individual ultimately create a certain intangible investment, or inter-relationship, as the period of service increases. It is of mutual advantage to both that such an investment be protected.

End (Resume reading on page 68)

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"Abbe-56" REFRACTOMETER

ADVANCES IN TECHNOLOGY

Pasteurization of Crab Meat Extends Keeping Without Impairing Color, Aroma or Flavor

Large numbers of organisms, including *E. coli*, present in fresh crab meat are killed by exposure to temperatures of 160 F. for 10 min., or 170 F. for 1 min. These treatments also slightly improve the color, flavor and aroma of the meat.

These are results of experiments in which a total of 99 lb. of fresh crab meat—57 lb. white, 42 lb. darker claw—were tested. Samples purchased in 1 lb. cans were divided into 3 parts. Two portions were canned, sealed and pasteurized, the third was used as a control. Total bacteria counts, presence of *E. coli*, pH values were determined, organoleptic tests were conducted.

Temperatures and times used for pasteurization were: 145 F., 30 min.; 150 F., 20 min.; 155 F., 15 min.; 160 F., 10 min., 170 F., 1 min. Only the latter two conditions proved beneficial.

Total bacterial count of non-pasteurized samples ranged from 100,000 to 220,000,000 per g., with 15% containing *E. coli*. The pH ranged from 7.35 to 8.5. Bacterial counts of samples pasteurized above 160 F. were less than 2,000 per g., and all were free from *E. coli*.

White non-pasteurized meats were rated: Color, 91% v.g.; aroma, 84% v.g.; flavor, 21% v.g., 45% good, 34% fair. Following pasteurization, they were rated: Color, 92% v.g.; aroma, 87% v.g.; flavor, 37% v.g.; 33% good, 30% fair.

Non-pasteurized claw meat rated: Color, 95% v.g.; aroma, 86% v.g.; flavor, 30% v.g.; 30% good, 40% fair. Pasteurized claw meat rated: Color, 93% v.g.; aroma, 85% v.g.; flavor 32% v.g.; 32% good, 36% fair.

With one exception, pH values of pasteurized samples were within 0.2 of original readings.

The pasteurization operation can be performed in present crab meat plant equipment with addition of a scaler.

The process does not sterilize the meat, but it prolongs keeping quality for a considerable time.

Digest from "Pasteurization of Crab Meat," by J. V. Anzulovic and R. J. Ready, U. S. Dept. of Interior, Fish & Wildlife Service (Washington 25, D. C.), *Fishery Leaflet* 416, Feb. 1954.

Off-Flavors Developed In Irradiated Meat

Experiments in the sterilization of foods by gamma radiation from nuclear fission products have not been encouraging, principally because the process gives an objectionable taste to treated product.

Meats thus sterilized kept well in storage, but the off-flavors present an obstacle to commercial application of the process.

Several factors were found to affect the dosage requirements for sterilization. Important were: Type and concentration of contaminating organism; nature of medium in which they were contained, and presence of air. Of little or no effect were pH of medium containing organisms and presence of free radical acceptor, sodium ascorbate.

Samples of ground beef, beef tenderloin, pork luncheon meat, and ham in cans were subjected to a two-million rep_{Si} dose of gamma radiation from a 10-kilocurie source of cobalt-60. Time required was 24 hr. Samples were stored at different temperatures and opened at 1-2-month intervals.

Irradiated beef resembled attractive fresh meat, but fat had separated from pork luncheon meat and had a pinkish hue. Irradiated ham was firmer and lighter in color than thermally processed sample.

No consistent differences in off-flavor were discovered with respect to temperature or duration of storage. Most of the tasters reported varying degrees of off-flavor.

Digest from "Recent Experiments in Radiation Sterilization of Foods" by G. B. Pratt and O. F. Ecklund, presented at the Canning Problems Conference, National Canners Assn., Atlantic City, N. J., Jan. 25, 1954.

Studies of Egg Shells

Egg shells are not highly uniform structures, but show considerable differences from bird to bird.

Using previously developed methods, a lot of 50 eggs from 14 hens (Rhode Island Red X Light Sussex) were studied over 14 days. For this group shell thickness was found to follow closely the equation $Y = 4.83X - 15.8$, where Y is the thickness in microns, and X the weight of shell in mg. per sq. cm. (Surface area of a fresh egg can be estimated by the formula $S\ (sq.cm.) = 4.67W^{2/3}$, where W is its weight in g.)

Pore counts ranged from 107 to 227 per sq. cm. for different birds. Porosity coefficients, membrane protein, shell protein, pore protein, and matrix protein were all significantly different from bird to bird.

Calcium, carbonate, and magnesium were essentially constant in all shells, but phosphorus and citric acid contents were different. Results indicate that hen's eggs have individual characteristics peculiar to each bird, and that the methods used will distinguish them.

Digest from "Studies on Egg Shells. III. Some Physical and Chemical Characteristics of the Egg Shells of Domestic Hens," by C. Tyler and F. H. Geake, *Journal of the Science of Food & Agriculture*, 587-96, Dec. 1953.

BAKING

Bread Stick Process

Retarding fermentation at two stages of the process, and manual stretching of the dough strip at an-

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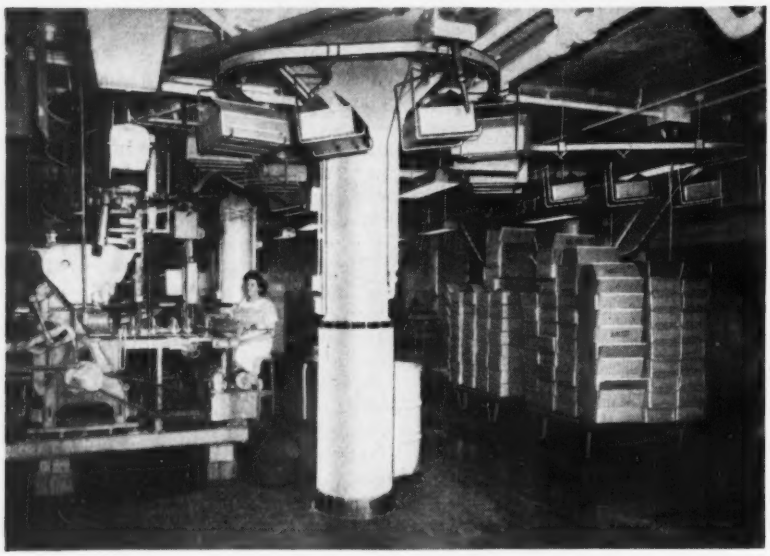
No "jam" on this line...



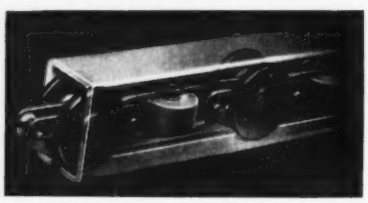
R-W "ZIG-ZAG" Conveyor serving the preserves line of the First National Stores, Inc., Somerville, Mass.

R-W "Zig-Zag®" Continuous Power Conveyor

removes production bottlenecks

The First National Stores, Inc., Somerville, Mass., solved their handling problems on the preserves line with a Richards-Wilcox "ZIG-ZAG" Conveyor System. Zig-Zag takes handling overhead, keeps production moving efficiently and continuously, releases valuable space and personnel for other uses.

R-W ZIG-ZAG Conveyors are quality manufactured to guarantee you many long years of the utmost satisfaction in performance. Their amazing versatility makes them adaptable to almost any plant conditions—they move up, down, in, out and around—just like water through a pipe. Standard 6-inch carrier pendant centers make Zig-Zag easily adaptable to changing production needs.



ZIG-ZAG Conveyors may be relocated or extended by plant personnel, usually using all the original parts. They save on maintenance costs and help lower production costs through increased efficiency.

ZIG-ZAG Conveyors are designed to take your handling problems out of your hands. For complete information consult with your nearest R-W Engineering Office—no obligation, of course.

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other, are the novel features of a patented process for making bread sticks.

Dough is mixed and divided into substantially globular pieces which are rested in a chamber where conditions of temperature and moisture are unfavorable to proofing or fermentation. This step lasts about 5 min.

Dough balls are then shaped into elongated cylindrical pieces that are again rested in a retardation chamber for 15 min. This is followed by hand stretching in which the cylinders are twirled and stretched until they are of suitable diameter. Elongated pieces are then baked, and the product cut into suitable lengths for packaging. Entire process takes about one hour.

Digest from U. S. Patent 2,660,134, issued Nov. 24, 1953, on an application dated July 14, 1948, to L. M. Bertrand, Montreal, Canada, assigned to The Grissol Bread Specialities Ltd., Rosemount, Quebec.

Manually Operated Cake Filler

Using a hand operated injector pump for filling cakes is covered by a recent patent.

The simple apparatus of stainless steel comprises a suitable container for the filling material, a lid, and a sleeve extending through the lid. Within the container the sleeve holds the elements of an injector pump that extends to the bottom. Outside and above the container the sleeve supports a hand plate for operating the pump, and two horizontal tubes connected with the pump.

In operation, two cakes are pressed onto the tubes, hand plate is depressed, and a predetermined quantity of filling material is forced into the cakes. At completion of downward stroke operator releases his hand pressure and an internal spring restores the elements to their original position, ready for the next filling operation.

Digest from U. S. Patent 2,659,320, issued Nov. 17, 1953, on an application dated Nov. 16, 1951, to L. H. Browne, Westport, Conn.

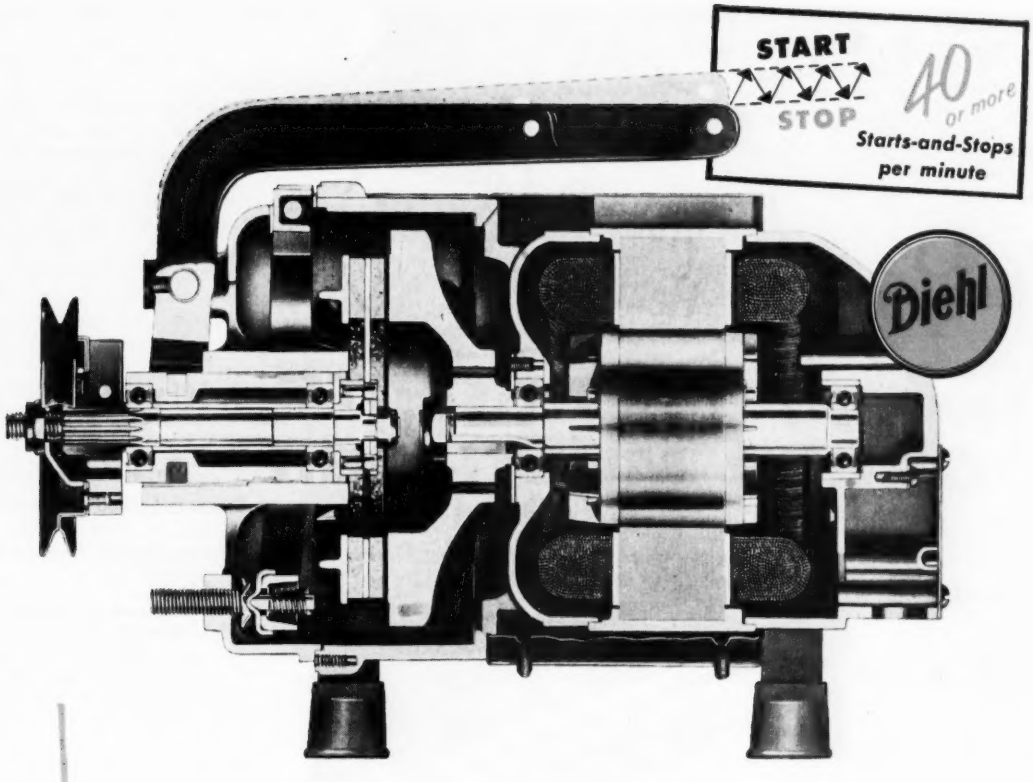
DAIRY

Effect of Transport On the Fat In Milk

Investigation has been made of churning effect on milk caused by agitation during truck transportation from farm to factory, especially in partly filled cans.

In the first test, afternoon milk was cooled to 52, 70, and 82 F. and from each lot one 10-gal. can was filled to the base of the neck, and one about one-third way. One 3 gal. can of 70-deg. milk was left in the dairy as a control.

The six cans under test were trans-



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Unequalled for Repeated Start-Stop Machine Operation

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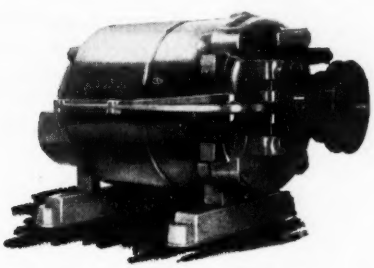
HIGH INERTIA FLYWHEEL • TOTALLY ENCLOSED MOTOR

Repeated, rapid start-stop machine operation, impractical with conventional motor drives, is now obtainable with Diehl Power Transmitters. Forty or more starts and stops per minute, hour after hour, are commonplace with these drives. Many manufacturers have made substantial increases in machine output by the shortening of acceleration and deceleration waiting periods.

In one compact unit, the Diehl Power Transmitter incorporates a totally-enclosed fan-cooled ball bearing motor; a high inertia, dynamically balanced flywheel; a positive short-throw, lever-actuated clutch brake assembly. The actuation may be controlled mechanically or electrically.

These Power Transmitters are now used extensively on machine tools, textile machinery, winding and spooling equipment, conveyors and many other types of machinery where repeated starting and stopping is required. In countless instances, the use of Diehl Power Transmitters has made it possible to simplify machines, reduce costs, improve operation, save space and eliminate over-motoring solely for acceleration. Many of *your* troublesome machine drive problems may be solved with Diehl Power Transmitters.



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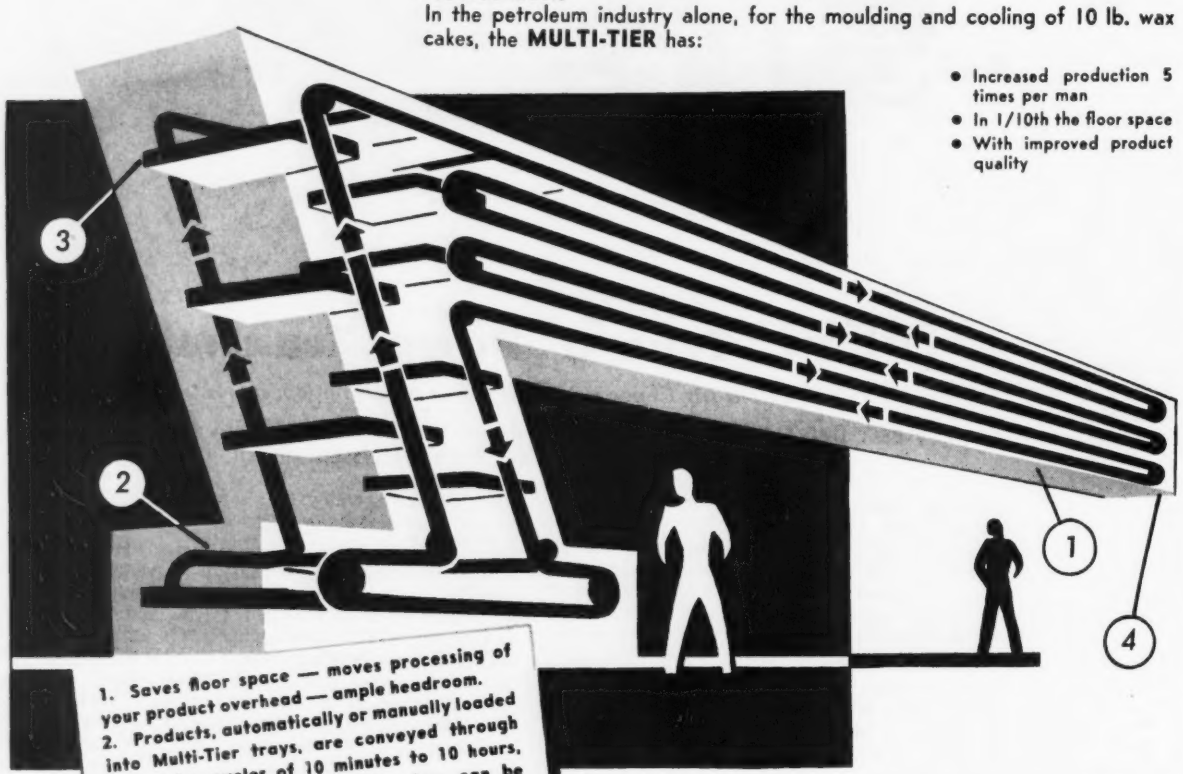
Make new PROFITS with a GREER MULTI-TIER

. . . because wherever installed, MULTI-TIERS have saved floor space, increased production and reduced labor.

In the petroleum industry alone, for the moulding and cooling of 10 lb. wax cakes, the **MULTI-TIER** has:

- Increased production 5 times per man
- In 1/10th the floor space
- With improved product quality



1. Saves floor space — moves processing of your product overhead — ample headroom.
2. Products, automatically or manually loaded into Multi-Tier trays, are conveyed through processing cycles of 10 minutes to 10 hours, without jar or jolt. Unloading, too, can be manual or automatic.
3. Trays always perfectly level—permanently attached to positive chain drive. Custom built to fit your product.
4. Available with plain or insulated enclosures to meet wide range of cooling or heating requirements.

For over 35 years **GREER MULTI-TIERS** have pioneered new concepts of continuous processing in the food, petroleum and other industries. Consider continuous processing of your products with a Multi-Tier.

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GREER

ported by truck a distance of 12 miles over a road, parts of which were rough. The 70 and 82-deg. milks were in insulating boxes with straw. After taking samples the milks were warmed to 96 deg. and separated.

No perceptible difference in flavor of whole milk samples was detected before refrigeration and after three days storage at about 38 F. It may be concluded that no lipolytic changes had taken place. There was no difference in fat content of skim milks from full and partly filled cans at 52 and 70 deg., and only a slight difference in the 82-deg. samples. Slight fat dispersion is consistent with failure to develop rancidity.

A second test was more severe, milk being allowed to stand 17 hr. to form a cream layer before transport. Two lots were cooled to 60 and 78 deg. and a third was uncooled at 96 F. Transport distance was 23 miles over fairly rough road.

The 60- and 78 deg. milks had good flavor before refrigeration and after storage at 38 for 4 days. The 96-deg. milks had a malty off-flavor. Similar conditions prevailed in creams obtained from them. Degree of lipolysis in the whole milks was very low. Microscopic examination revealed no clumping of fat globules in any milk except the uncooled lot in the partly filled can. Fat dispersion in the whole milk was practically nil.

Microscopic examination of the cream showed a considerable number of large fat globules and of medium size clumps in all samples except that from the 96-deg. milk in the filled can, where the number clumps was smaller.

Digest from "Influence of Agitation During Transport on Milk Fat," by N. King, *Proceedings*, XIIIth International Dairy Congress, The Hague (1953), II, 208.

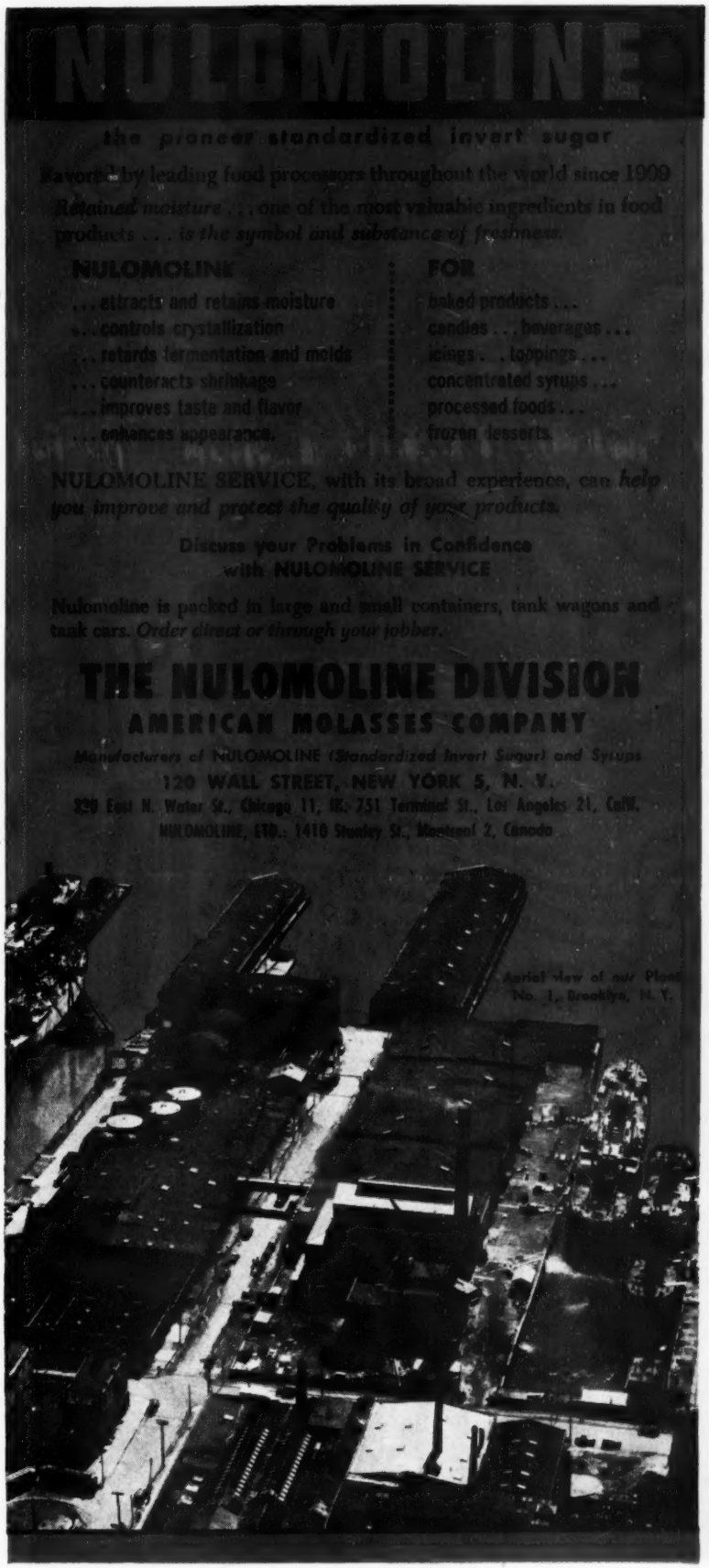
PACKAGING

Protective Packaging Of Frozen Foods

Quality in frozen foods is largely dependent on protection against: (a) Evaporation, which results in loss of weight and fresh appearance; (b) exposure to air, which causes changes in color and flavor; (c) loss of volatile flavors; (d) enzymatic activity; and (e) loss of vitamins.

Among nonrigid, impermeable frozen food packages are bags, pouches, or wrappers that can be closed by dead fold, heat sealing, twisting and tying, or used as inner liner, or as overwrap.

Typical are aluminum foil (plain or laminated), cellophane, polyethylene, polyvinyl chloride, rubber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flavors by leading food processors throughout the world since 1909
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NULOMOLINE SERVICE, with its broad experience, can help you improve and protect the quality of your products.
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Why worry about selecting the most efficient pump for the job? A Deming Distributor is within easy reach of your plant. He has what it takes to help you select the right type, size and capacity of pump for any one or more of your pumping needs. If you don't know where to locate Deming Distributors in your area, ask us.
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DEMING PUMPS
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hydrochloride or latex, and waxed papers and parchment. These are used for whole or cut-up fowls, fish or meats, and other irregular shaped products.

Rigid, relatively permeable packages are waxed cartons used for butter, cheese, and prepared foods. Rigid impermeable containers include aluminum cans, glass jars, plastic jars, and tin cans. They are used extensively in the home and locker plants for "runny" fruits and precooked foods; and commercially for juices and fruits with syrup.

Finally, dip coatings of thermoplastic materials form good protective packages. Frozen food may be dipped into the molten thermoplastic mixture, whereupon a coating solidifies on the surface of the commodity, forming a continuous protective film.

Digest from "Protective Packaging of Frozen Foods," by J. G. Woodroof and W. Rabak, *Refrigerating Engineering*, 45-48, Feb. 1954.

CANNING

Production and Use of Steam In the Canning Industry

Renewed emphasis on efficient production and use of steam is needed, not only through natural desire for economy but also in view of development of other methods of sterilizing canned food products.

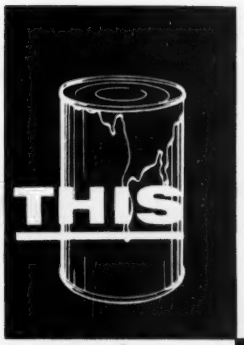
A well engineered steam plant is a vital factor in cannery operating costs, but it can be designed only after a careful analysis of plant operations. This calls for a knowledge of steam demand, both peak and operating, of each piece of equipment, and of the steam requirements of various food products.

A good example of the wide variance between peak and operating demand is found in the retorting operation. During the venting period the peak demand may vary from 2,500-6,000 lb. 1 hr. for a standard 3 or 4 crate retort, depending on size of the steam inlet line. Peak drops rapidly to an operating demand of 100-150 pph.

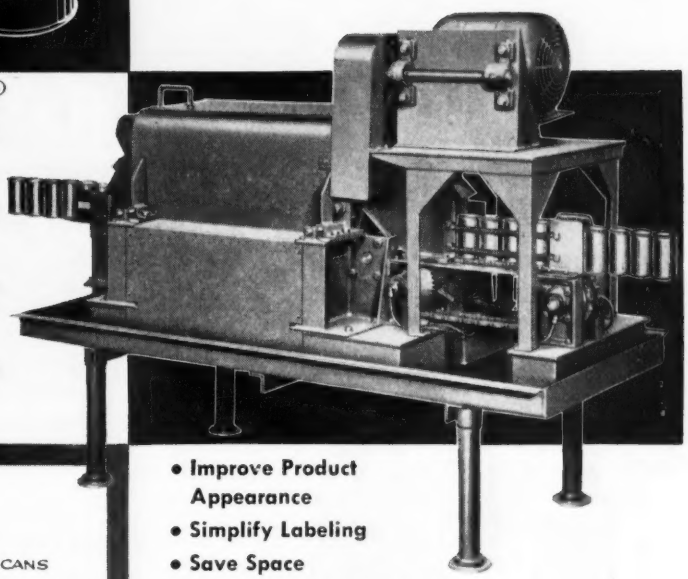
Once the unit operation demands are determined, a complete analysis must be made of each operation with respect to occurrence and timing of these demands. It is then a simple matter to sum up peak and operating demands that occur at any given time. Highest figure will be maximum demand for operation.

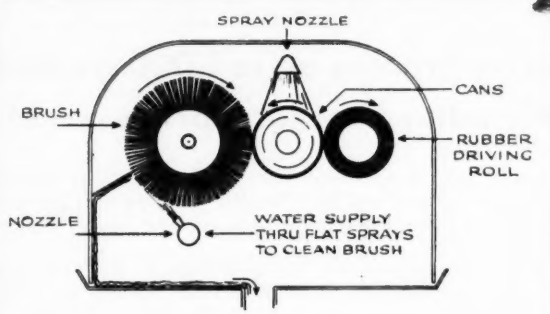
Selection of boiler and fuel will be determined to some extent by local conditions. Distribution system must be adequate, and provision should be made for possible future expansion. It is better to oversize the steam plant

You can Eliminate THIS



with the REX® Roto-Brush Can Cleaner and Dryer





HERE'S HOW IT WORKS—Cans enter machine vertically and are turned automatically to an endwise position. They travel in a depression between a rubber roll and the long-lasting, *self cleaning* brush. The roll holds the can against the brush and revolves it rapidly. The brush scrubs the can thoroughly as it revolves while Rex Flat Spray Nozzles direct a hard-hitting stream of detergent spray against brush and can. In a few seconds the can is completely clean and dry, ready for the next step.

- **Improve Product Appearance**
- **Simplify Labeling**
- **Save Space**
- **Save Time • Cut Costs.**

Here's the effective answer to cleaning and drying of most sizes of cylindrical cans. The Rex Roto-Brush Can Cleaner and Dryer completely *removes all overflow from the sides of the cans*...assures permanent sticking of labels, eliminates rusting and unsightly "soak through" on labels.

This efficient unit eliminates need for long air drying conveyors. Washing and drying can be concentrated into a 3′ x 7′7½″ to 8′1″ area. The whole cleaning or drying operation is done in seconds...cans are moved at speeds up to 300 per minute.

Why not assure bright, sales-making containers for your product. See your Chain Belt District Sales Engineer or mail the coupon.

CHAIN BELT COMPANY

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Send me informative literature on the Rex Roto-Brush Can Cleaner and Dryer.

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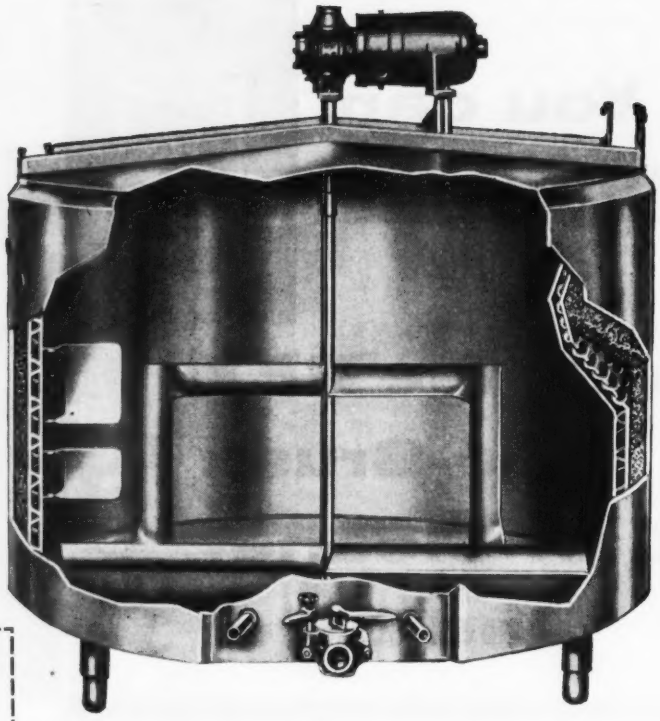
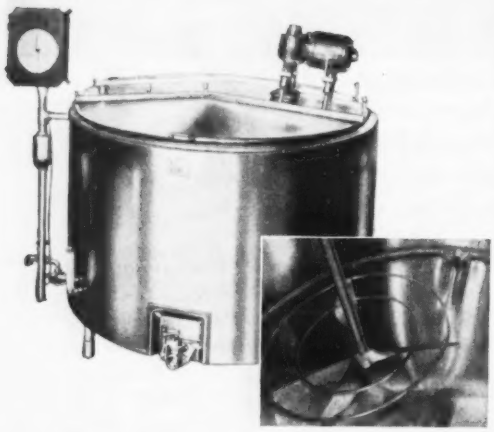
New 3-way agitation

SPEEDS UP HEATING AND COOLING





Why you get a *uniform* mix with the Pfaudler "Supermixer"

This 500-gallon Pfaudler "Supermixer" has every feature you need to produce a *uniformly* blended, fully pasteurized ice cream mix. For example, the special two-speed reinforced heavy-duty agitator (inset) handles *both* frozen and powdered products equally well. Good agitation combined with fast heating assure quick heat transfer.

Adaptable for other products, easy to operate, stainless steel inside and out for easy cleaning, the "Supermixer" is an outstanding buy. You even get a bonus in capacity. Though rated at 500 gallons, its actual capacity is 590 gallons! It handles partial or full batches efficiently. Bulletin 852-FE-4 gives you the complete story—write for it.

Quickly process up to 1,000 gallons in Pfaudler pressure process vats

To help you cut operating time in heating and cooling of full or partial batches, this Pfaudler stainless steel pressure process vat has been redesigned to give more efficient agitation.

A sweep-type agitator, working close to the tank bottom, rotates slowly at 9 or 18 R.P.M. Speeds are easily interchanged. In combination with the side wall baffles, it sets up a three-way fluid flow:

1. Rotating agitator creates circular motion of product.
2. Pitched blades direct fluid upward, for bottom-to-top circulation.
3. Baffles deflect product into center of vat, forcing other product out to walls.

Thus every ounce of your product is brought into contact with the walls, for exceptionally fast heating or cooling.

For partial batches, baffle may be removed to prevent entry of air at surface level.

Available in capacities of 500, 800, and 1000 gallons, Pfaudler pressure process vats are of all-welded stainless steel construction. Bottom and side are separately jacketed. Both are tested to 100 psi. Bottom jacket may be used alone for small partial batches.

Heating is by vapor steam or hot water; cooling is by tap or chilled water. Special ammonia jackets also available.

For full details, send for Bulletins 852 and 871-FE-4

THE PFAUDLER CO. Pfaudler REG. U.S. PAT. OFF. **ROCHESTER 3, N. Y.**

than to rely on overloading an undersized one.

Typical steam consumption values for retorting different products average about 6.5 lb. per case of 24 No. 2 cans. This is a good figure for estimating requirements, and is consistent with the total of 250-300 lb. per retort. Approximate steam consumption, peak and operating, is given in the original article for a variety of unit operations.

Digest from "Steam Requirements in Canning," by J. H. Bock and Lawrence Newsome, presented at Canning Problems Conference, National Canners Assn., Atlantic City, N. J., Jan. 24, 1954.

Cannery Boiler-Water Carryover Damages Food Containers

Detinning and other forms of external damage to processed food containers can be charged primarily to improper boiler operation, and second to the general adoption of lighter (electrolytic) tin coatings for most classes of food products.

Increased demand on boiler capacity has resulted in overloading to a point where alkaline material is entrained in the steam and carried over into the retorts. There, in contact with cans at high temperature it removes some of the tin, damages the enamel or lithography, or forms unsightly white deposits on the outside of the cans.

Detinning is more serious with electrolytic coating than with the heavier hot-dipped plate, but in either case rusting ensues. A related problem is a discoloration of tin where cans contact iron retorts, crates or baskets. A galvanic cell is formed by the two metals and the alkaline electrolyte formed by boiler carryover.

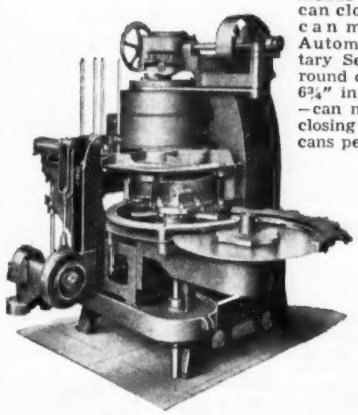
Remedial measures are to be found in: (1) Treatment of boiler water to prevent foaming and priming, and (2) correct boiler operation. These two factors will control carryover due to both mechanical and chemical causes.

Chief among mechanical causes are high water level, overloading, undersized steam mains, and lack of steam drum internals. Chemical causes of carryover are to be found in total solids of boiler feed water, high suspended solids, and animal oils.

Corrective measures include suitable feed-water regulators, oil separating equipment, increased frequency and duration of boiler blow downs, water treating equipment, steam traps and drip legs.

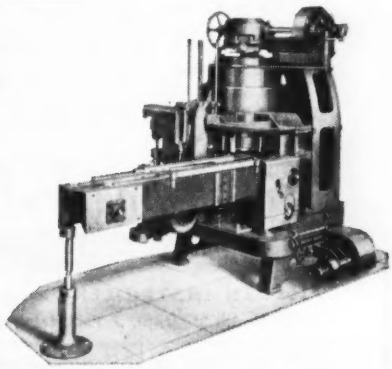
Overload, of course, can be handled only by its reduction or by additional boiler capacity; and undersized steam mains must be replaced by larger pipes. Purity of steam can be measured by specific conductance which is an indirect method of measuring

Angelus Automatic Seamers for round cans are available in a wide variety of styles with capacities ranging from 30 to 400 or more cans per minute, disc feed and straight line feed, can rotate or head rotate type, for vacuum or non-vacuum closing. Angelus Seamers, the result of more than 40 years of specialized experience in development and production, are the ultimate in simplified, functional design that assures minimum investment, minimum production costs and minimum maintenance.



MODEL 50-P—For can closing and can making. Automatic Rotary Seamer for round cans 5" to 6¾" in diameter—can making or closing up to 150 cans per minute.

MODEL 59-P-MSLF—Chain feed for can closing only. Automatic Rotary Seamer for round cans 5" to 6¾" in diameter—can closing up to 150 cans per minute.



Investigate the advantages of low cost production, low cost investment, and low cost maintenance with Angelus Automatic Seamers.

Write today for complete details on models and an Angelus Engineered Application Recommendation.

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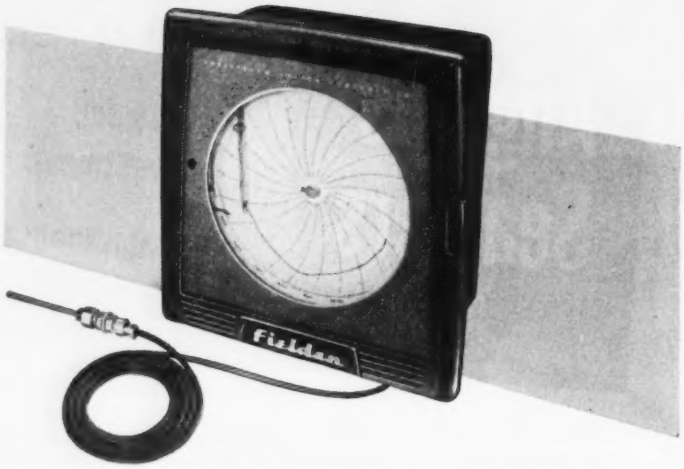
For more information, use coupon on page 175.

can you really buy high accuracy at low cost?



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Fielden TEKTOLOG Recorder

Fielden TELSTOR Indicator

Fielden TEKTOR Control

total solids in the condensed water.

Digest from "Effect of Boiler Water Carryover on Containers," by A. E. Mudra and R. Royce; "Boiler Water Treatment to Avoid Carryover," by C. J. Schafer; and "Boiler Operation to Control Water Carryover," by F. L. Blumenshine; presented at Canning Problems Conference, National Canners Assn., Atlantic City, N. J., Jan. 24, 1954.

BEVERAGES

Scoring Beverage Cocoas

Cocoa powders for beverage use may be evaluated organoleptically by making them into a drink containing 40 g. cocoa and 80 g. sugar, well mixed with ¼ l. of water and heated to boiling with constant stirring, then mixed with ¾ l. of whole milk.

After milk addition, beverage is heated to full boil, poured, and cooled to 122 F. before testing. Tasters should not be given more than 5 samples, and should submit written opinions before being acquainted with the significance of the test, though they should know its purpose from the beginning.

Beverages should be scored for taste, odor, color, sedimentation, and powder color, using a scale of 5 for perfect, 4 for very good, 3 for good, 2 for satisfactory, 1 for acceptable, x for poor, and xx for very poor.

Whether results of tests should be evaluated by using sum of individual scores or by examining the array of scores can be debated, and the ranking of the products tested can depend on which method is used.

Taste and aroma are the most important characteristics in the scoring. Beverage color is important but secondary. Sedimentation and powder color are of subordinate importance.

Digest from "The Organoleptic Investigation of Cacao Products," by A. Knepp, *International Chocolate Review*, No. 1, 1-6, 1954.

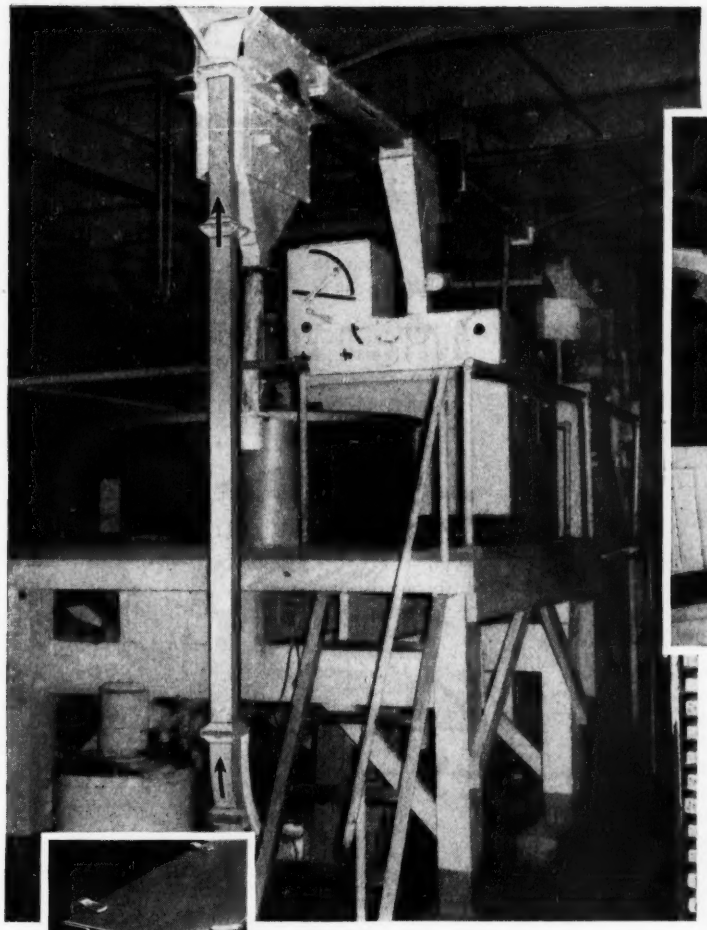
FRUITS & VEGETABLES

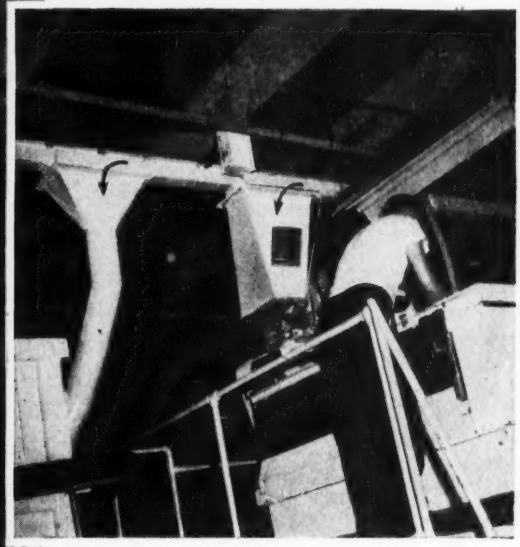
Quality of Tomato Juice Tied to US Grade

Color of raw juice from a representative sample taken from a load of tomatoes is more indicative of final canned quality than inspection of the whole tomatoes.

This is due to variations in intensity between exterior and interior color that results from unfavorable weather conditions.

When weather is very favorable, however, grade A juice can be made from tomatoes graded as No. 2A—a subdivision of No. 2 for tomatoes lacking in color but otherwise perfect. Two grades of No. 2 were used in this





The Quality Macaroni Company
St. Paul, Minnesota

First step in the movement of Durum flour when it arrives at the Quality factory is to unload it into an elevator which lifts it to the fifth floor where it discharges to a special sifter. After thorough sifting flour moves to a 3" REDLER Runaround Conveyor that continuously circulates flour and discharges only as needed to mixing and other automatic machines.

Taking the "Hand" Out of Handling . . . REDLERS Move Flour in Sealed Flow

At the Quality Macaroni Company, St. Paul, protection of purity through automatic handling and processing has been raised to a fine art. No hands touch "Quality Brand" products from the time flour bags are emptied until the housewife opens the "Quality" package.

In this scientific operation, S-A REDLER Conveyors have a big part. These totally enclosed conveyors guarantee that no impurities can get into the Semolina (macaroni flour) as it moves through processing.

The REDLER System is practically automatic, with the flour moving smoothly and discharging at numerous points to processing machines. Any excess flour simply recirculates in the REDLER until needed. The whole system is compact, dust-tight and insures maximum protection against fire and explosion hazards.

S-A REDLER Systems can be engineered to meet practically any plant layout—even where space is at a premium. Why not find out how REDLERS can help you? Mail the coupon today.

SINCE 1901 S-A STEPHENS-ADAMSON MFG. CO.

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(name of product)

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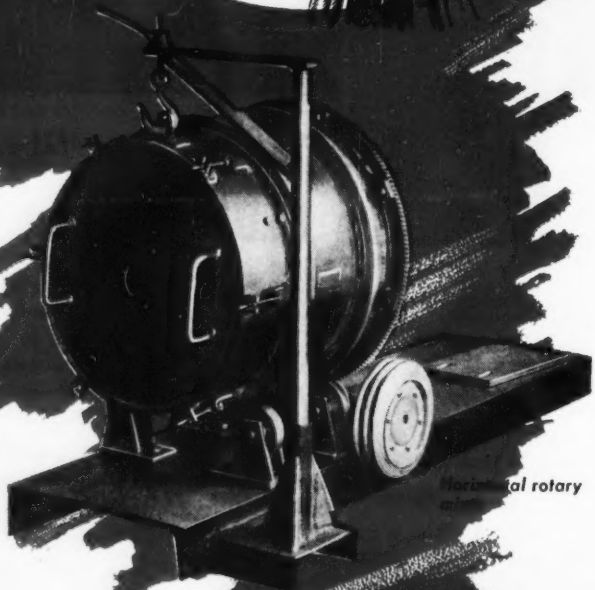
12'0" x 17'0" stainless clad jacketed tank

BACK IN THE 1800's

WHEN ANNIE OAKLEY JOINED BUFFALO BILL'S SHOW

Koven

WAS MAKING INDIVIDUALIZED FOOD EQUIPMENT



Horizontal rotary

Through the years, the name Annie Oakley has become inseparably associated with show business. And during this same period, KOVEN has become indelibly stamped on the minds behind industry — minds that realize that KOVEN has been a pioneer in developing improved individualized equipment for the food industry. For efficient, economical production — they know through experience to turn to KOVEN for equipment made to their exact needs. If you have a production problem, one of our trained representatives will be glad to discuss it with you — of course, there is no obligation. Send for Facilities Catalog #490.

Complete modern facilities including X-ray inspection and stress relieving which insure quality control. KOVEN equipment in all commercial metal and alloys include: pressure vessels, extractors, mixers, stills, condensers, kettles, tanks, chutes, containers, stacks, breechings, coils. Fabrication to A.S.M.E. Code Par. U-68 and U-69 a specialty.

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Food Engineering Reports
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In Keeping Up With Field . . . page 205

project; the second, No. 2B were defective and damaged. This grade, which usually has good color, was found unsuited for production of satisfactory juice because of the large losses incurred from trimming, and the high mold counts in the final juice.

Results of the 4-yr. study seem to indicate that US No. 1 tomatoes should be used to insure production of fancy juice, and No. 2A for standard.

Digest from, "Tomato Grades and Juice Quality," by J. C. Moyer, *Farm Research*, (Pub. by N. Y. State Expr. Sta., Geneva, N. Y.) 14, Jan. 1954.

Enzyme Regeneration In Canned Foods

Enzyme inactivation and subsequent regeneration in canned foods has become an important factor in determining processing time, particularly in the short-time high-temperature process of sterilization.

Studies show that enzyme regeneration does occur and that the time-temperature relationship for high-temperature processes must be established for complete enzyme destruction in some products to insure flavor stability.

In a series of tests, fresh peas were washed, blanched, cooled and filled into cans with boiling brine. Cans were processed for various lengths of time to calculated sterilizing values in an agitating-type retort at 260 F. and in still-type retorts at 250-240 F.

There was no detectable peroxidase activity in any of the canned variables within 2 hr. after processing; but in 24 hr. the variable, given the shortest process in the agitating retort at 260 F., had a fraction of 1% of its original peroxidase activity. After 1-2 weeks' storage at room temperature 2 other similarly processed variables revealed notable regeneration of peroxidase.

After 8 months' storage all variables were taste-tested, and those that had continually showed evidence of peroxidase activity throughout the study had a definite viny-type off-flavor. No enzyme activity was detected in any of the variables processed in a still retort at 240 F.

Digest from "Enzyme Regeneration in High-Temperature Short-Time Sterilized Canned Foods," by R. B. Guyer and J. W. Holmquist, paper presented at Canning Problems Conference, National Canners Assn., Atlantic City, N. J., Jan. 25, 1954.

Treasure of them all!
FELTON
PURE
VANILLA
Felton goes right to the heart of the best vanilla areas in the world —Mexico, Madagascar and the Bourbon Islands—for its superb, full-bodied pure vanillas. But that's only half the story. To be worthy of the label "Felton," our vanillas are subjected to endless laboratory control-testing. Only then is Felton ready to offer you its vanilla . . . the treasure of them all!
For the very best Mexican and Bourbon Vanilla . . . Made to your own specifications, at the most advantageous low prices.
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FLASH DRAINAGE!

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WIRE MESH CONVEYOR BELTS

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No solid surface to block drainage! No pores, seams or cracks to trap solutions! Wash or cooling water, cooking oils or other process liquids drain from your product through the openings of the wire mesh belt in a flash.

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Beech-Nut's Sanitation

—*Continued from page 59*

As for cleaning of equipment, stainless pipes, parts in contact with food, and floors, this is the job of the night crew of 30 men.

Part of the crew is assigned to the 4th-floor strained foods-cooking area. Here, ten stainless steel cookers (3,800 lb. capacity) are filled with water, heated to 212 deg. F., emptied, hand-brushed, rinsed, again sterilized with 212-deg. F. water, and emptied into units on the floor below. Also cleaned and sterilized in the same manner are four stainless cereal cookers (2,500 gal.) and six stainless 50-gal. pressure cookers (for chickens).

A meat grinder, guillotine knife, and 5x25-ft. stainless inspection table are cleaned with a steam-pressure hose, hand-scrubbed, and rinsed with cold water.

Since peanut roasting is carried out on this floor, only the floor must be mopped.

Another group of men on the 3rd floor cleans and sterilizes five pulpers. All removable parts are dismantled, pressure hosed, cleaned in a tank with detergent, rinsed, then reassembled after the pulpers have been scoured and rinsed. Pulpers are then sterilized by running in boiling water from the ten cookers on the floor above.

To avoid possible weevil infestation in the adjoining room, four peanut blanchers are taken apart every week and cleaned, especially to remove accumulated nut meal. A similar number of plastic-coated peanut-inspection belts are washed daily.

On the second floor, five 3,800-lb.-capacity, stainless vacuum-holding tanks and four 400-gal. stainless holding vats are cleaned in the same manner as the 4th-floor cookers.

In the adjacent peanut butter processing room, equipment that is dismantled, cleaned, and sterilized includes three grinders, a Votator mixer-type heat-exchanger, and a 4-spout piston filler. Wiped with a clean, damp cloth are the rotary capper, sealer, labeler, coder, and conveyor belt.

Another group takes care of equipment in the 1st floor strained foods filling room. Cleaned are four 500-jar-per-min. filling lines, each comprising an unscrambler, jar sterilizer, 30-head rotary filler, 16-head sealer, coder, and retort-crate loader. Parts from the filler and sealer that contact product are dismantled, washed with pressure hoses and hot water, scoured, rinsed, assembled, and blown dry with hot air. Ten labelers are cleaned with air hoses, wiped off, and certain

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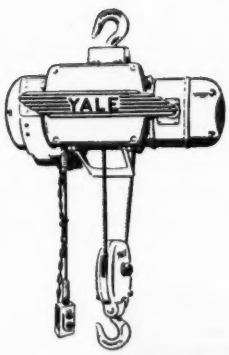

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The Fred P. Rapp Supermarket in St. Louis has its own bakery right on the premises. Because of this location, it is entirely different from most neighborhood bakeries. The bakery counter must be ready to serve the supermarket customer with her modern shopping habits. And, since biggest sales are in the afternoon and evening, the bakers concentrate on late morning and early afternoon baking.

GAS and Gas Fired Equipment helps meet these demands. A Gas Bake Oven operates 12 hours each day. In this way, the bakers keep a constant flow of oven-fresh bread, rolls, pastries, cakes and other specialty and variety baked goods . . . and assure the customer of premium quality merchandise.

Wherever Modern Gas Baking Equipment is in operation, you'll find similar outstanding results. Bakers from coast to coast agree that the flexibility, economy, and dependability of GAS make their operation more efficient. If you're among the few who aren't using GAS already, why not call your Gas Company Representative right away for more information on where GAS may help you improve your bakery operation.

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parts thoroughly hosed off with water.

Also cleaned by steam-hosing, brushing, and rinsing are six lines for peeling, trimming, inspecting, and washing vegetables. Over 200 60-lb. capacity aluminum containers that are used to carry ground vegetables from 1st-floor to 4th-floor cooking area, are cleaned daily.

Production Crew Helps

At Beech-Nut, production-line workers have been taught good housekeeping — with special accent on prompt cleaning. Promptness not only is good practice but also saves effort and is cheaper in the long run.

All plant workers are furnished with white clothing, which is laundered and sterilized twice a week in the company laundry. Women are supplied with gowns, hairnets, and headbands. Men are furnished with caps, jackets, and trousers.

End (Resume reading on page 60)

Better Bread

—Continued from page 88

by a large motor. Driver consists of a knife that cuts the bread-dough ribbon extruded from the developer in pan-size pieces.

Speed Control

White, whole wheat, and rye bread can be handled. Type of grain or texture—coarse or fine—is regulated through speed control. Ingredients used are the same as now employed in bread standards. But their characteristics are not necessarily the same. For example, the broth is a basic composition of fermented sugar, yeast, salt, and water. Calcium, phosphates, other flavoring materials, and enrichment elements still can be added.

Time of ferment in broth is particularly important. It is stated that flavor improves with length of time allowed. However, too long a time may invite difficulty in loaf making.

In the new process, mixing raises dough temperature 15 to 20 deg. F. Incoming broth is cooled in plate unit to a temperature that permits outgoing dough to run about 100 deg. F. for best results in proofing.

Weight control at panning reportedly can be held to within ±5g.—or less than ⅛ oz. Softness in wrap is reported excellent. Finished pH is 5.1 to 5.2.

Pans used have been found to need only slight amount of grease for release. The fine-grained type of loaf has been attractive to first consumers.

End (Resume reading on page 89)

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● IT'S the automatic A1C Elec-Tri-Pak! A versatile, low cost net weigher and filler designed to streamline production—eliminate inaccuracy and unnecessary hand labor in plants packaging up to 20 units per minute.

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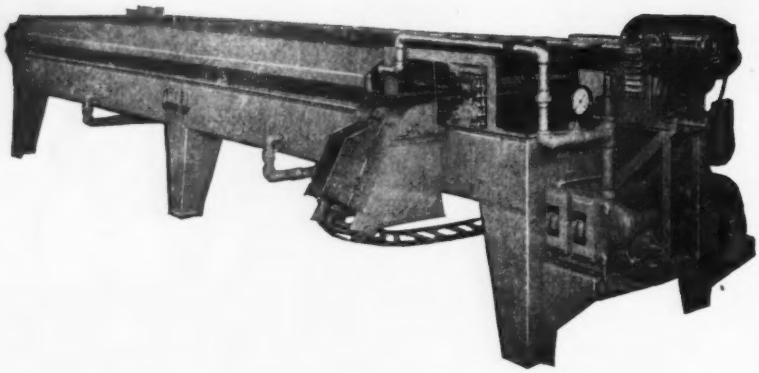

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8-Row Model—No. 10s		168 cans
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(diameter)	411 to 700 high	168 cans
12-Row Model—up to 400 high		384 cans
(211 to 404)	400 to 411 high	300 cans
(diameter)	411 to 700 high	252 cans
11-Row Model—up to 400 high		352 cans
(112 to 300)	400 to 411 high	295 cans
(diameter)	411 to 700 high	232 cans
16-Row Model—up to 400 high		512 cans
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(diameter)	411 to 700 high	336 cans

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Color Control

—Continued from page 75

At last November's brewing show, a Swiss developed flicker type photometer, The Buhler Bros. Ultra Photometer, was introduced for measurement of absorption and turbidity in foodstuffs. This employs only a single photocell in measurements—the analysis beam being flickered between the sample and reference. Thus, the errors due to need for matching photocells is eliminated. With high narrow-band sensitivity, the unit looks very interesting for critical measurements in the spectral bond.

Another flicker-type photoelectric colorimeter—the "Colorede"—is a product of Instrument Development Laboratories, Inc. This is composed of rugged component assembly "blocks" for in-stream mounting. It features a servo-actuated output signalling device that can be connected directly to standard recorders and controllers.

Some of the older, more established color instruments are also displaying improvements in line with the trend to more rapid and simpler color control.

Photovolt Corp.'s widely used Reflection Meter, for example, is now equipped with a compact, cable-connected "search unit" that contains light source and photocells. This can be flexibly located—that is, laid on the product, thus eliminating sample insertion. It is conceivable that a modification of this unit could be set up for permanent in-line use. Incidentally, tri-stimulus filters can be also supplied for use in the search unit.

Photovolt reports that it has furnished this instrument for color measurements on coffee, mayonnaise, mustard, peanut butter, sugar, and flour—a growing testimony to the value of photoelectric colorimetry.

Gardner Laboratory, maker of the Hunter meter, also isn't letting progress pass it by. It has recently redesigned the Color Difference Meter to include servo-driven scales that automatically register readings. These simplify the procedure and reduce operator time by an estimated one-half.

Finally, the spectrophotometer makers plan to play a large part in future in-process food-color control.

Beckman Instruments, for example, recently improved its well-known unit with a moderately priced integrated circular-drum continuous recording chart. This should speed basic routine spectral analysis relating to color.

Coleman Instruments offers the compact, modestly priced "Junior

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This 50 gal. WEAR·EVER Aluminum container weighs only 25½ lbs.

. . . AND IT'S MADE FROM THICK, TOUGH, 10-GAUGE ALUMINUM ALLOY

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Wear-Ever aluminum containers are completely sanitary. Their smooth, seamless inside surfaces, rounded corners, and continuous welds where sections join, meet all Government inspections and sanitary codes. They're non-rusting, corrosion resistant, can't splinter. They neither pick up and pass along odors, nor can they affect taste, flavor or color in any way.

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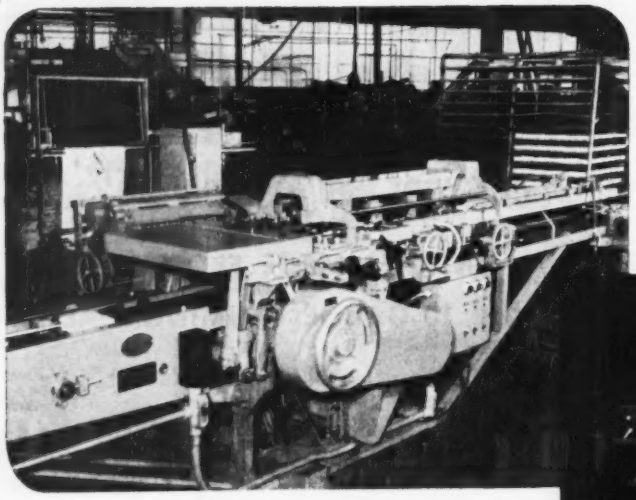
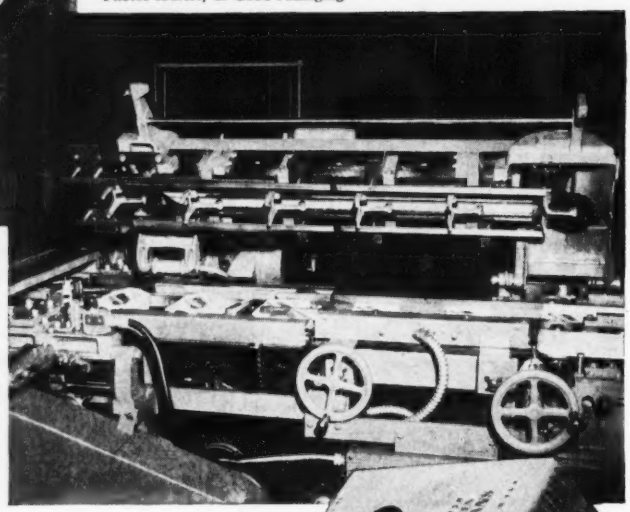


High-speed Model FF-H wrapping frozen foods for Libby, McNeill & Libby.

Photos courtesy of Good Packaging



With the counterbalanced transport assembly raised, entire top package level is exposed for easy cleaning and adjusting.

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GUARANTEED TO WRAP 160 PACKAGES A MINUTE, the compact Model FF-H fits perfectly into any packaging set-up. Every part that requires cleaning and adjusting is easily accessible. For example, the entire top package level is exposed simply by raising the counterbalanced transport assembly. Advanced design distributes loads evenly throughout the wrapping cycle — bearings and moving parts are free from shock. As a result, the Model FF-H operates with remarkable smoothness even at highest speed — and that means long life.

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157a Transmitter Bul. FE 3303
157b Motor Cat. FE 3310
158 Multi-tier conv.
159 Nulomoline sugar
160 Pumps
161 Can cleaner-dryer
162 Bulletins 852, 871-FE-4
163a Seamer 58-P
163b Seamer 59-P-MSLF
164 All items shown
164a Tektolog recorder
164b Telstar indicator
164c Tektor control
164d Resistance rec.
164e Multipoint rec.
164f Series 97
165 Conveyors
166 Facilities Cat. 490
167 Vanilla
168 Metal conveyr. belt
169 All items shown
169a Trucks
169b Hoists
169c Finance plan
170 Gas
171 Net weigher
172 Spinner-coolers
173 Aluminum containers
174 FF-H wrapper
177 Xacto meters
178 Lubricants
179a Drive Cat. D-419
179b Motors
180 Marinite insulation
181 Expand-O-Veyor
182 Filters
183 V-belt Catalog
184 Butter flavor
185 Ind. air conditioning
186 Mix-Mullers
187a Steel drums
187b Steel pails
188 MSG
189 Wrappers
190 Conveyr. guide rails
191 Motors
192 Choc. tempering mach.
193 Pulley Bul. 350C-1
194 Pump Buls. 624, 625-A3
195 Sifters
197 Scale Bul. 2001
198a Valves
198b Fittings
200 Pallet conveyor
201 (See page 49)
203a Boiler Bul. 2K
203b Sterilamps
204 Pineapple flavor
207a Steel
207b Trap Bul. 853
208a Antifoam A
208b AF Emulsion
209-212a Polyethylene
209-212b Stock Package Cat.
213a Belt Cat. 5
213b Air coolers
213c Compressors
214a Starches
214b Thickening agents
214c Filter paper
214d Filter cloth
214e Asbestos pads
215 Two-way radio
216 Exchanger Cat. 12
217a Conveyor belting
217b Pump Bul. 54SE
218a Coder 500
218b Coder 200
218c Consultant
218d Metso Granular
219 Truck refrigeration
220a Casters
220b Wheels
221a Food colors
221b Vanillin
222 Battery Buls. 3808, 2039
223 Lubricants
224 Controls Cat. 500
225 Ammonia service
226a Piston valves
226b Bulk mtl. mover
226c "Eyes of the Bin"
227 Selector
228 Varidrive
229a Powdered flavors
229b Auto-Printer
230 Cooker Sheet H-12
231 Motors
232a Conversion tool
232b Tri-clamp
235a (ad) Switch Data ESL-4
235b (ad) Generators
235A Valve Bul. 500
235B Steel Bul. 10
235C Joint Bul. 5080
235D Split bearings
235E Batteries
235F Brewery Bul. 308
235G Washer Bul. AD-5396
235H Wrapping machine
235I Bul. 5442-8-52-300
235J Cooling tower
235K Redwood tanks
235L Dust Bul. 171
235M Motor Bk. GEA-6013
235N Valves
2350 Steel Hdbk. FC4
234 (ad) Labeler
234A Washer Bul. 1045
234B Form 4964
234C Burner Bul. H-17
234D Pump Form HP206
234E Meter Wk. S210
234F Gages
234G Contr. Bul. F-6149
234H Index device
234I Liquid-level contr.
234J Contr. Bul. F-451
234K Oven Bul. FS-230
234L Switch Bul. A-5965
234M Lab. apparatus
234N Tube Bul. P1261
2340 Filter
234P Headspace analyzer
234Q Temp. Cat. 1022
234R Moisture Wk. FM-1
235 Propylene glycol
236 Polyethylene
237a Hose stations
237b Mixing units
237c Pulper
237d Agitator kettle
238a (ad) Float controls
238b (ad) Indicator tags
238A Table Bul. P-54
238B Hoist Bul. BH51103
238C Conveyr. Wk. 4505M-OP
238D Scoop Bul. 863
238E Egg Bul. 1153
238F Loading ramps
238G Truck Bul. MPF151
238H Ford truck
238I Conveyor belting
238J Truck Data 751
238K Buls. 102, 103, 104, 106
238L Crane truck
238M Glycerine
238N Emulsifier Cat. ZI-57
2380 Glass blocks
238P Pipe insulation
238Q Rubber coating
239a Motor Bul. 4-lp 21
239b Motor Bul. 4-lp 31
240 Food equipment
240a Pepperoyal
240b Solublized seasoning
241 (ad) Condensers
241A Plastic boxes
241B Water hose
241C Fumigant
241D Gage Bul. 375
241E Metal Bul. 108
241F Leavening agents
241G Insul. Bul. IN-122A
241H Rust Cat. 253
241I Fire Bul. RF-853
241J Floor Bul. AIA. 3-B-1-2
241K Fittings Bul. 3025-A
241L Emulsifier
241M Paint
241N Antibiotic Bk. C-115
2410 Insul. Bul. UTT 11-53
241P Guar gum
241Q Flavor brochure
242a (ad) Pressweld casters
242b (ad) Deep-well pump
242A Lab. Cat. 35-E
242B Pumps
242C Poultry-plant cleaning
242D Brochure KD738
242E Contr. Bul. A-699
242F Case Vol. 2
242G Signal Circ. 1752
242H Bulletin AD-607
243 Stainless steel
245a Pressure washer
245b Consultant
245c Natural spices
245d "Cold-Cels in Action"
245e Catalog CE
253 Seasonings
254 Water-cooler Bul. 3666A
255 Boxes
256 Hollow-screw processor

Coupon expires July 10, 1954

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April 1954

Spectrophotometer "that features simple knob adjustment to any desired wavelength and interchangeable scales. Recently, this instrument was selected by the AOCS's oil-color committee as most practical for its standard oil color measurement.

In the past year, American Optical Co. placed its Rapid Scanning Spectrophotometer on the market. This employs a cathode tube oscillograph that replots the spectral curve of a sample 60 times per second. It thus permits actual monitoring of a production stream to observe effect of process on color values. A comprehensive study of this new device in color evaluation of various foods was recently carried out by Rubin Pomerantz at M. I. T.

Many other recent instrument developments related in some way to color measurement are not listed here in the interests of space economy. However, even the above partial list should give the food engineer a good inkling of how the tool-shed is being stocked to help him solve the many problems of tomorrow's in-stream color control.

End (Resume reading on page 76)

Continuous Roaster

—*Continued from page 85*

and controlled at a rate up to 3,500 cu. ft. per min.

Incoming air temperature is raised to about 165 deg. F. as it leaves the cooling zone and reaches the third-zone heating unit. It then varies with the amount of steam pressure in the coils in each heating zone. It does not, however, exceed a temperature of 300 deg. F.

By automatically controlling the damper and rate of flow, amount of waste heat is kept at a minimum. Exit-air temperature runs approximately 165 deg. F.

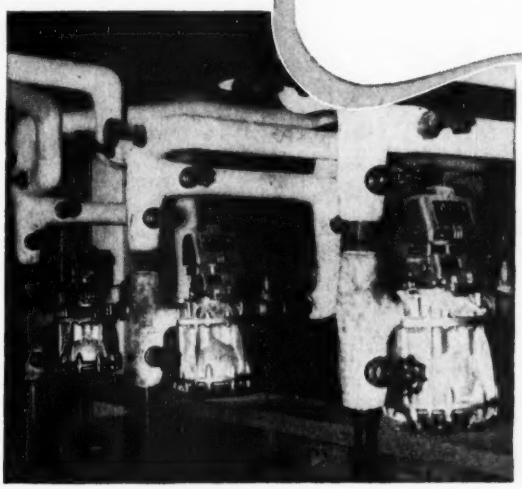
Provided as guides are thermometers for exhaust-air temperature and cocoa-bean temperature. These instruments are just ahead of the third roasting zone. Located in the second roasting zone is a thermocouple, which is hooked up to an automatic temperature control for regulating a discharge vane. In turn, this vane controls the output from the roaster and compensates for variations in steam pressure, incoming air temperature, or incoming bean temperature.

From discharge vane, roasted and cooled cocoa beans drop into a worm-screw conveyor that feeds them into a bucket elevator going to cracker and fanner.

End (Resume reading on page 86)

FOR ASSURED PRODUCT UNIFORMITY USE . . .

XACTO METERS



There's no guesswork and practically no chance for human error when Bowser Xacto meters are used . . . delivery quantity can be predetermined . . . and then automatically shut off when completed.

Wherever extreme accuracy is an important requirement in the measurement or batching of liquid food ingredients . . . you'll find that Xacto meter can do the job easier and more accurately than you are now doing.

XACTO . . . *the world's most widely* used meter!

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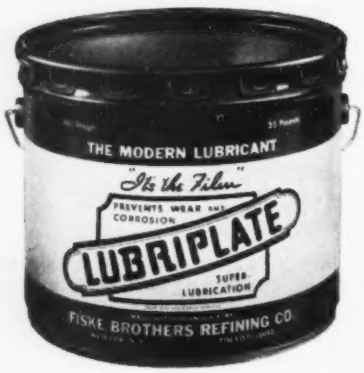


Questions & Answers

THIS MONTH'S PROBLEM

Filling-Line Change-Overs

Question—We have been gradually adding new products and container sizes to our line. As a result, we have now reached the point where change-over time on filling and labeling lines is becoming a serious problem. The volume of our items does not justify installing new lines to handle them, yet the frequent changing is costly. Can you offer any solutions to this dilemma?

FEBRUARY PROBLEM

Faster Macaroni Drying

The Question Was—Our production has not kept pace with increased sales of macaroni and spaghetti. We find that drying these long strands in our "dry rooms" is becoming a bottleneck in otherwise highly mechanized processing and packaging operations. Can you suggest a method of speeding up this step.?

Answer—Until recently, drying of long goods has not kept pace with such developments as bulk handling of semolina, continuous mixing and extruding, and automatic spreading of macaroni onto sticks. However, considerable research on drying conditions has recently resulted in substantial improvements in this field.

At least one large macaroni manufacturer in this country operates huge continuous, imported long-goods dryers, which take only 24 hr. for complete drying. However, cost of these dryers is so high that only high-volume producers can afford to install them. Probably in a matter of time, machinery makers in this country will perfect similar equipment. We believe that one is now operating with a limited degree of success.

In present designing of a drying room, automatic controls are being employed to circulate large volumes of air. Too, wet and dry bulb temperatures now vary only on a pre-determined time cycle to permit drying within a minimum time and without danger of checking or warping of walls in the drying room. Result is a careful control of product quality and higher output per square foot of floor space.

In operating these modern drying rooms, it is only necessary to load them and then press a button to start the drying cycle.

We suggest that you contact manufacturers of drying rooms for complete information on macaroni drying rates.

These manufacturers can "tailor-make" these rooms to handle your size of drying racks in the most efficient numbers. If your present drying methods are several years old, you may be pleasantly surprised at the additional output that you can turn out in the present space by adopting the latest drying techniques.

Wishes To Make Table Syrup

Question—Do you have a formula for a table syrup containing maple syrup?

Answer—Blend in a stainless steel or glass-lined mixing tank, 87½ percent of high grade sucrose syrup (67 deg. Brix) and 12½ percent of blended maple syrup (67 deg. Brix).

Sucrose syrup should be low in ash and free of colloidal material to prevent subsequent masking of the maple flavor. It should also be flavorless, except for sweetness.

Heat syrup to 190 deg. F. in heat-exchanger, filter, fill hot into bottles, and cool in spray type, continuous cooler.—*P. X Hoynak, Refined Syrups & Sugars, Inc., Yonkers, N. Y.*

Has Odor Problem

Question—We pack concentrated tomato pulp in glass containers, using a crown top as a closure. Toward the end of the packing season, a distinct fish odor was encountered upon opening samples for inspection. After leaving jars open, the odor soon disappeared and flavor of the pulp was not adversely affected. This prompted us to open jars representing batches

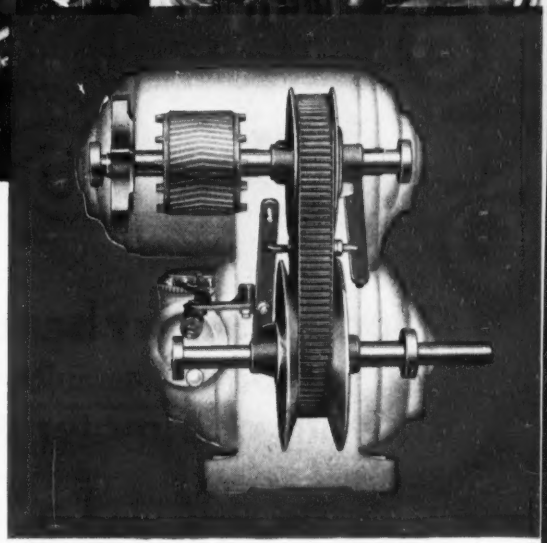
How Would *You* Do It?

Readers are invited to submit to FOOD ENGINEERING answers to questions to "This Month's Problem." Selected answers will be published with credit (unless you specify otherwise). We pay space rates.

What is *Your* Problem?

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.



PRODUCTION ON TUNA CLEANING LINE UP 20% AT WESTGATE-SUN HARBOR CO.

Speed-Trol variable speed drives increased production 20% and maintain our high quality of product, writes J. C. Miller, Superintendent of Westgate-Sun Harbor Co. . . . we adjust speed of cleaning line according to size of fish and therefore always operate at full capacity . . . labor and maintenance costs are at a minimum . . . Speed-Trol's streamlined design meets our high sanitary standards because it is easy to keep clean.

Speed-Trol...Variable Speed at its Best

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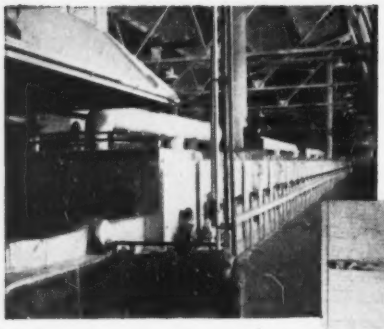
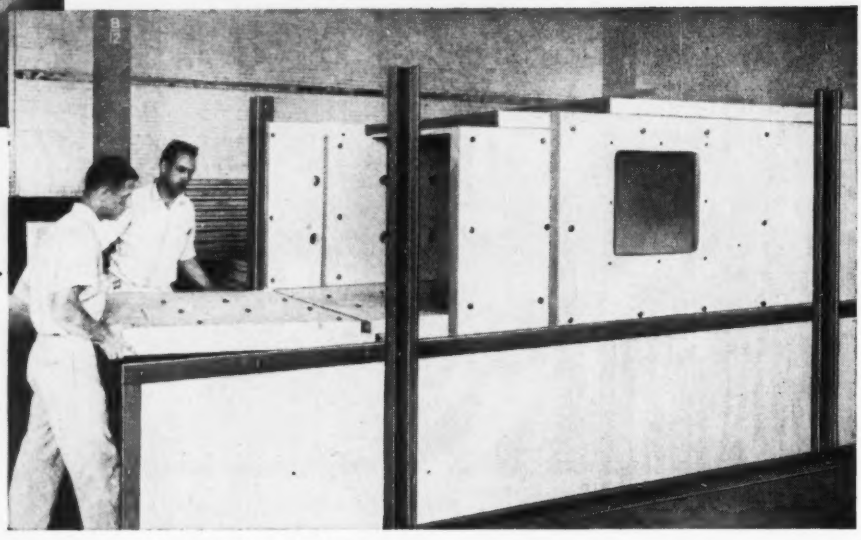


Typical band oven built with Marinite insulation. Insulation engineering by Johns-Manville.



Mechanics assembling a Marinite bakery oven. Marinite is used both as the structural and insulating material.

Modern bakery band ovens are *Built* and *Insulated* with one material . . . J-M MARINITE

When leaders in the baking industry look for ways to improve band-oven performance, they realize that efficient insulation is a primary requirement. Johns-Manville provides the answer to this need with J-M Marinite*, the *structural* insulating material. Marinite improves band-oven performance in three important ways:

1. Cuts fuel bills—because it is an efficient thermal insulation . . . heat loss through Marinite oven walls is very slight. Fuel savings are substantial, for ovens of this type operate 24 hours a day, at temperatures up to 700F.

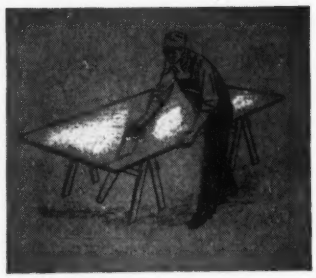
2. Improves temperature control—because it eliminates almost all through-metal fasteners and reduces the need for structural supports. Marinite construction provides uniform temperatures throughout the oven without local hot spots.

3. Reduces maintenance—because it is entirely unaffected by the high humidity and corrosive organic gases commonly prevalent in band ovens. Installation costs are also lower than with former methods of construction.

The Marinite oven installation illustrated here is but one example of how Johns-Manville insulating materials and Johns-Manville insulation engineering services are teamed with industry to develop improved processes and more efficient equipment. If you would like more information about Marinite Insulation and its application to your product or plant equipment, write Johns-Manville, Box 60, New York 16, New York. In Canada, 199 Bay Street, Toronto 1, Ontario.

JOHNS-MANVILLE JM PRODUCTS

*Reg. U. S. Pat. Off.



Marinite is an asbestos insulating material that combines great structural strength and excellent thermal characteristics. It is durable . . . proved in years of field experience. It is workable . . . can be fabricated with woodworking tools . . . can be cut, punched, shaped to fit. Also available fabricated to your specifications, ready to assemble.

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MATERIALS • ENGINEERING • APPLICATION

processed at various periods throughout the season. Only in a few instances could we detect a slight fishy odor. Can you help us trace the cause?

Answer—Two possible answers to your problem are: (1) Storing the closures near fish products, and (2) using closure-liner paper with odor-imparting constituents.

Undoubtedly, the odors concentrate in the headspace of the jar and soon disappear, once the container is opened.

If you are not storing the closures near odor-contaminating products, then we suggest that you contact your supplier of closures.

Wants to Make Frankfurters

Question—We specialize in manufacturing frankfurter and hamburger buns, but would also like to look into the possibility of processing frankfurters. Can you furnish us with complete details on how to make frankfurters as well as with a good basic formula to use as a starter?

Answer—The manufacturer of frankfurters involves six major steps—grinding, mixing, stuffing, smoking, cooking, and showering.

The amounts of different types of meats in a formula vary considerably, but under no circumstance should you add too much pork—say over 35 or 40 percent. The remainder should be beef, and you can substitute veal for some of it. A strictly kosher frankfurter contains no pork, but beef or a mixture of beef and veal.

Having selected the meat formula, proceed with the first processing step—grinding. This involves running meat through the ¾-in. plate of a grinder to produce a coarse grind.

Now to the second step—mixing in the curing and seasoning mixtures in the silent cutter. This machine chops the meat and blends the curing and seasoning mixtures into it. Sausage makers refer to the meat as being emulsified.

A curing mixture comprises: Salt, 271 lb.; sugar, 31 lb.; sodium nitrate, 9 lb. 4 oz.; and sodium nitrite, 12½ oz. Add 3 lb. 2 oz. of this mixture to each 100 lb. of meat.

While the meat is being mixed, add

Q.—What's the average percent shrinkage of coffee beans during roasting, best brewing temperature, and per cent solids extracted from brew?

A.—Average shrinkage during roasting is 16%. Coffee is best brewed at 185-195 deg. F. And average solids extracted from brew are 24-25%.

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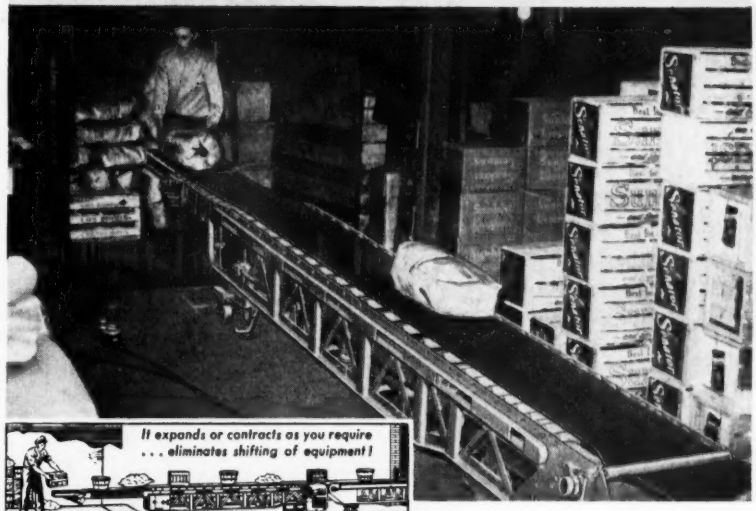
or CONTRACTS as you need it!



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is completely adjustable in length
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For more information on Farquhar portable, semi-permanent, and permanent power driven or gravity conveyors, write our engineering department, stating your problems. We'll be glad to consult with you . . . at no obligation, of course.

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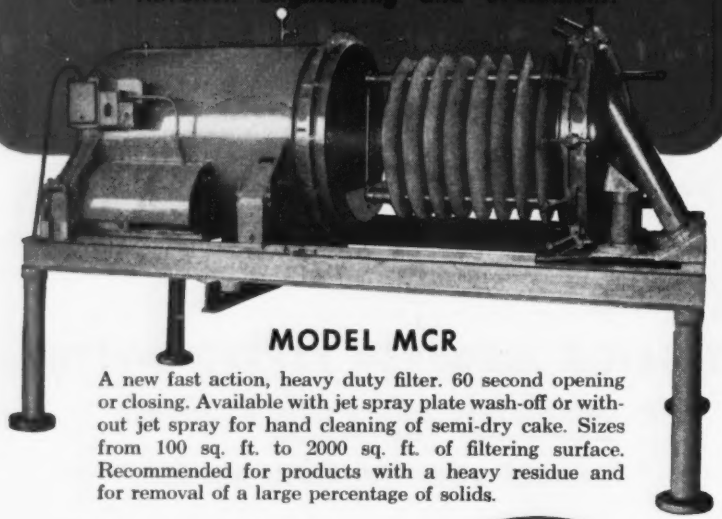

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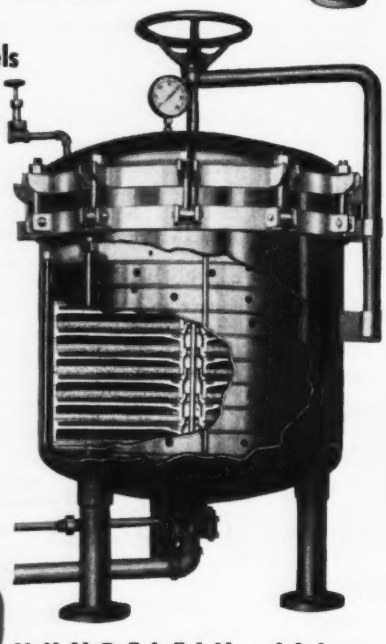

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seasoning, binder, and snow ice. Seasoning and binder are fairly uniformly added prior to the cutting operation. Ice is introduced during the cutting cycle to cool the meat to about 55 deg. F.

A simple seasoning mixture consists of the ground spices: White pepper, 5½ oz.; coriander, 2¼ oz.; nutmeg, 2 oz.; and cloves, 1¼ oz. This mixture is sufficient for a 100-lb. batch. There are prepared seasoning mixtures on the market. It might pay you to look into them since they will prove a time-saver.

As a binder, you can use about 3 lb. of powdered skim milk or a flour prepared from corn, potatoes, or soya beans to each 100-lb. batch. You might want to add more salt, say an extra

Q.—How can I figure out the capacity of wine casks in gallons?

A.—Multiply the square of the mean diameter by the depth in inches. Then multiply the product by 0.0034.

pound for every 100 lb. Some sausage makers enhance the flavor of the franks by adding 1 to 2 oz. of monosodium glutamate to every 100 lb.

Now that the batch has been thoroughly mixed and emulsified, go to the next step—stuffing the sausage meat into hog, sheep, or artificial casing. The stuffed casing is then automatically formed into uniform lengths by a linking machine.

Links are now hung on smokesticks, which are arranged on cages suspended from an overhead monorail for feeding into smokehouses. Links are usually sprayed with water to remove pieces of meat.

Smoking time will depend upon thickness of links as well as amount of moisture in meat. However, franks are smoked at about 160 deg. F. and until internal temperature of the wieners reaches at least 120 deg. F.

In multi-duty smokehouses, frankfurters are alternately smoked, cooked, and showered. Franks are now live-steam-cooked, to an internal temperature of 140 deg. F. Finally, they are showered until internal temperature reaches 70 to 80 deg. F., and stored in a low-humidity cooler.

Re Hot Sauce Formula

Question—Our firm would like a formula for the preparation of a hot sauce that will comply with government specifications. All that we know is that such a sauce consists of dried hot red peppers, water, vinegar, and salt. Can you advise us of the amounts

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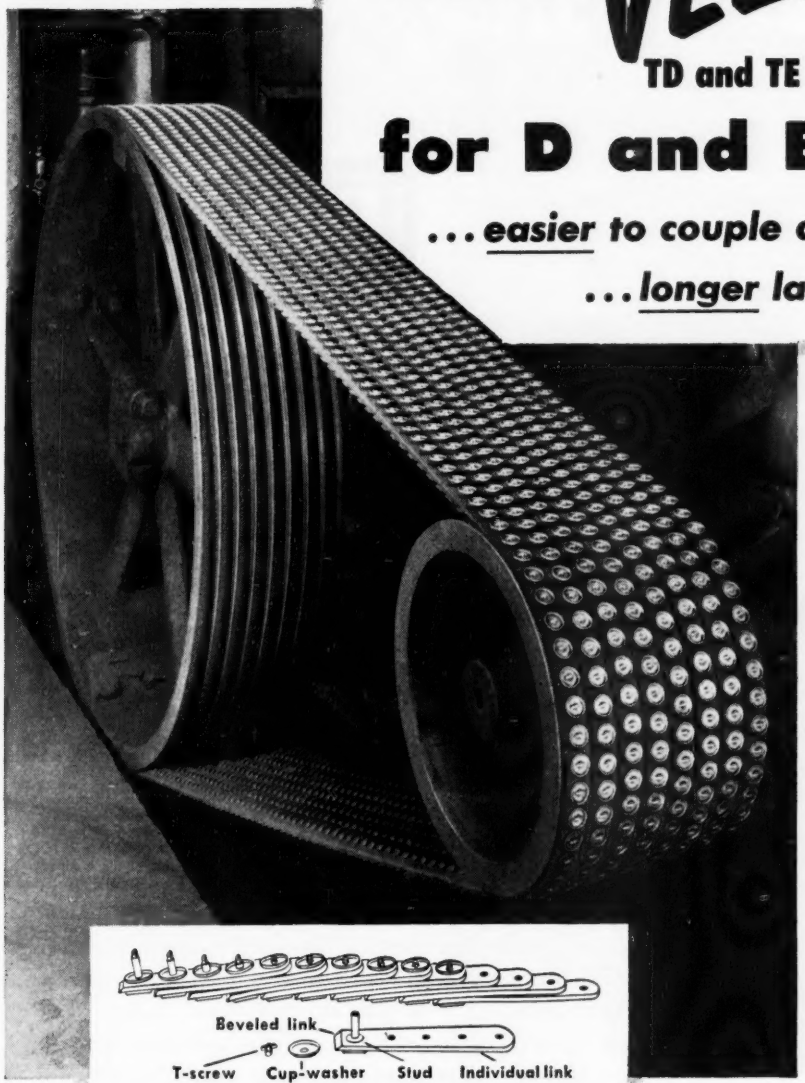
TD and TE Adjustable V-belts

for D and E Drives

...easier to couple and uncouple

...longer lasting



This detailed line drawing of the new Veelos TD and TE v-belt makes it easy to see how this new v-belt is designed to do a better job... easier!

Now get the v-belt that's been especially developed for D and E drives—the new, patented Veelos TD and TE adjustable v-belt!

This new Veelos has advantages unmatched by any other v-belt. It is *installed quickly* without removing the outboard bearings found on most D and E drives. It is the easiest v-belt to couple and uncouple ever developed. Cup-washers and T-screws join links together to form individual belts of any length. Veelos TD and TE *lasts longer* because new high-tensile strength links plus the new stud, cup-washer and T-screw design give *added strength* —combines this added strength with *maximum flexibility* for cooler, smoother running.

Install this new Veelos TD and TE v-belt on your D and E drives. Prove to yourself why there's no v-belt that can match the performance, the efficiency and the economy of Veelos TD and TE.

Get the complete story of this great new v-belt for D and E drives. Send the coupon now for new 8-page illustrated catalog.

VEELOS
THE LINK
V-BELT

Veelos is known as Veelink outside the United States.

T1

MANHEIM MANUFACTURING & BELTING CO.
605 Manbel St., Manheim, Pa.

Please send copy of your new Veelos TD and TE v-belt catalog.

Name.....

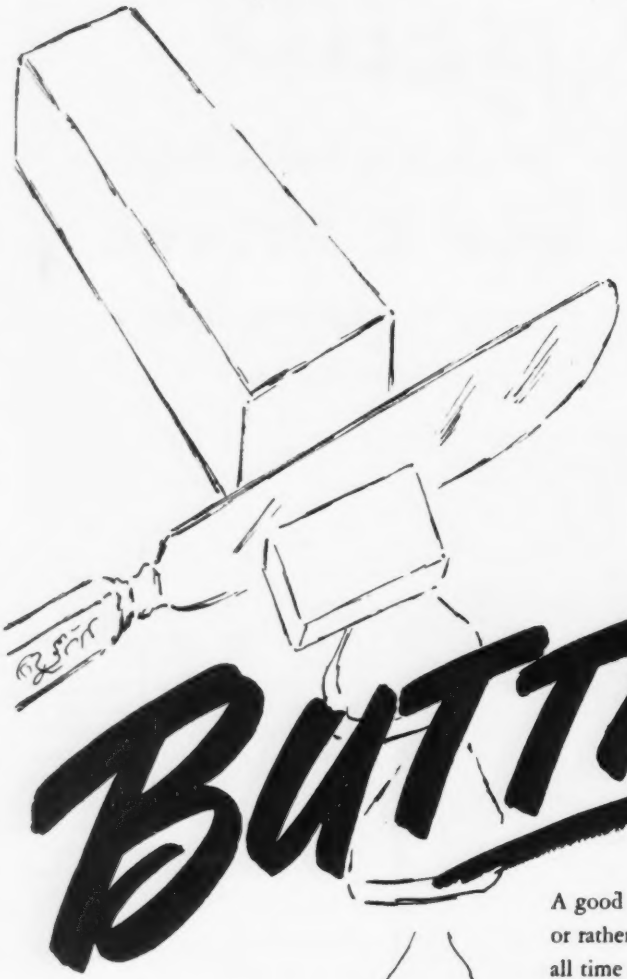
Company.....

Address.....

.....

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

For more information, use coupon on page 175.



D&O ESTABLISHED 1798

PRESENTS

BUTTATONE

A good synthetic butter flavor is traditionally "hard to find"... or rather WAS! Now this perennial phrase may be relegated for all time to the past tense... for the D&O Product Development Labs have created BUTTATONE! The fresh, very natural butter effect of this new compound (from which the usual harsh, synthetic character has been completely eliminated) makes possible a wide application in the food and confectionery industry. Candies, ice cream, dairy products, oleomargerine, baked goods, icings, chocolate items, mixes and canned foods... BUTTATONE may be used to advantage in all. A concentrated water-soluble flavor, based on a pure milk distillate, and supplemented with aromatic materials, BUTTATONE is also available in oil soluble form. Price in single gallon quantities . . . $7.00. Ask your D&O representative for trial amounts.

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SALES OFFICES IN PRINCIPAL CITIES

ESSENTIAL OILS • AROMATIC CHEMICALS • PERFUME BASES • VANILLA • FLAVOR BASES

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of these ingredients to use in a 48-gal. batch, as well as the aging time?

Answer—We checked the latest edition of "Index of Federal Specifications & Standards" and were unable to find specifications for a hot sauce or a pepper sauce. However, upon reviewing these specifications for other condiments, we believe that if they do exist it is unlikely that complete formulas would be given. Specifications might state an aging requirement if such were deemed significant—as in the case of Worcestershire sauce.

Elsewhere, published formulas seem scarce. A sketchy one simply states that brined, chopped red or green peppers are packed in jars and then covered with one part of brine and three parts of 50-gr. vinegar.

Bacon Fries Too Brown

Question—Recently, we have set up a small test kitchen in our plant to evaluate the quality of our meat products, especially in a manner in which the consumer would eat them (either cooked or uncooked). One problem we'd like help on is with our bacon, which fries to different degrees of brownness. Naturally, we'd like to supply our customers with fresh, sliced bacon that fries to a uniform, not-too-brown color. Have you any suggestions?

Answer—Researchers at the American Meat Institute found that brown-frying bacon contained relatively high amounts of reducing sugars. These sugars, derived from curing, react with amino acids to cause browning.

What's more, the brown color is concentrated by rendering out much of the fat while frying the bacon.

Also, the extent of browning was directly proportional to the amount of reducing sugars in the bacon—as the amount of these sugars increased, so did the browning.

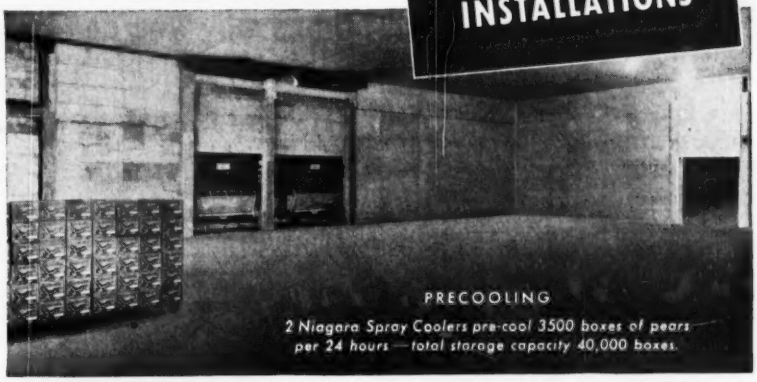
Reducing sugars are present in corn and raw sugars as well as honey and molasses. During curing, cane sugar may be broken down by certain microorganisms to form some invert sugar, which is also reducing. These microorganisms form organic acids or the enzyme, invertase, which inverts some of the cane sugars.

To obtain a good fixed cured color in bacon without formation of undesirable browning in the fried product, these researchers suggest using a mixture of 5-10 percent of corn sugar with 95-90 percent of cane sugar.

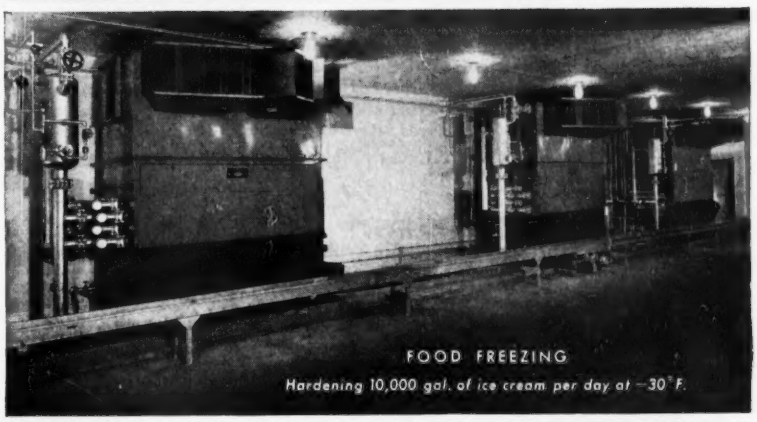
It is noteworthy to point out that some bacon from the same curing box may fry to different degrees of brownness, since they contain varying amounts of reducing sugar.

NIAGARA "No-Frost"

SUCCESSFUL IN BIG INSTALLATIONS



PRECOOLING
2 Niagara Spray Coolers pre-cool 3500 boxes of pears per 24 hours—total storage capacity 40,000 boxes.



FOOD FREEZING
Hardening 10,000 gal. of ice cream per day at −30° F.

FROZEN FOOD STORAGE
Room 80 ft. x 135 ft.—Temperature −5° F.

NIAGARA "No-Frost" gives you extra capacity and better operation. It improves quality, especially in foods, where it brings the product to correct temperature faster and holds it without fluctuation. It saves money for you in the cost of power and labor. With Niagara "No-Frost" there is never any "de-frosting" loss of time or temperature rise.

Write for Bulletin 105

NIAGARA BLOWER COMPANY

Dept. FI, 405 Lexington Ave.
New York 17, N. Y.

Sales Engineers in Principal Cities of U. S. and Canada

For more information, use coupon on page 175.

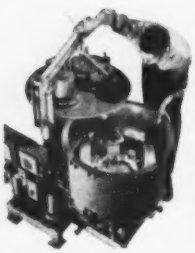
"Sure, your mixing problems are DIFFERENT . . . that's why you need MIXING EQUIPMENT ENGINEERED to meet your specific requirements"

• Having helped in the successful solution of hundreds of chemical process and food industry mixing problems, we *know* how different these jobs can be . . . there are hardly any two that can be handled in exactly the same way. And because these mixing, blending, reaction jobs are so widely diversified, you need the kind of equipment *and* experience that will give you the best solution, in the shortest time, at the lowest possible cost.

That's where *we* come in. We have the production "know-how" and we have the equipment. Simpson Mix-Mullers are the answer to any mixing problem involving dry, wetted or pasty materials, and are without equal when it comes to thorough mixing and blending to exacting specifications . . . thanks to the *controlled, proved Mulling Principle of Mixing!*

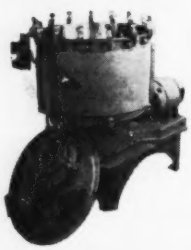
Why not submit your mixing problems to us for analysis? No obligation, of course.

. . . here's how we solved some typically different mixing problems:



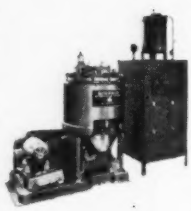
PILOT PLANT WORK
View shows a laboratory size Simpson Mix-Muller, specially equipped for mixing under vacuum and heat, in pre-testing trial batches in pilot plant work for electrical porcelain production.

ELECTRICALLY-HEATED
Special 24-in. laboratory size Mix-Muller, with thermostatically-controlled electric heating elements. Designed to operate under vacuum or pressure in preparing experimental batches. Equipped with stainless steel pan.



CORROSION-RESISTANT
This No. 2 Simpson Mix-Muller has stainless steel mixing surfaces for corrosion-resistance and improved sanitation. Unit is also jacketed for circulation of steam to aid in chocolate preparation.

HOT OIL CIRCULATION
This versatile No. 00 Mix-Muller prepares an infinitely variable number of different mixes under widely varied conditions. Equipped for vacuum and pressure, and jacketed for hot oil circulation.



WRITE FOR LITERATURE

SIMPSON *MIX-MULLER*® DIVISION
NATIONAL ENGINEERING CO. (Not Inc.)
644 Machinery Hall Building
CHICAGO 6, ILLINOIS

Lighting for Grading Foods

Questions—Could you offer suggestions on recommended lighting practices to be followed in cannery grading and inspecting operations? We are wondering if colored lights should be selected to facilitate the detection of color differences in fruits and vegetables. And, in general, what type of light is considered best?

Answer—Considerable work has been carried out on this important problem.

The basic problem is creating favorable conditions for spotting defects on products during inspection and grading. Involved are such factors as color of background and surroundings as well as the actual lighting itself—general and supplementary.

This subject can become quite technical, particularly with reference to brightness, reflectance, and similar factors. For more complete information, we suggest you contact the Illuminating Engineering Society. However, a few of our own general statements may be helpful for your preliminary studies.

Q. We have been troubled with pits or portions of pits in pitted cherries. Do you know whether they can be detected with an X-ray?

A. Unfortunately, opacity of cherries and juice to X-rays is such that pits do not show up clearly enough to permit commercial use of X-ray-detecting techniques.

General lighting should be about 20-ft. candles, with supplementary lighting over the work areas about 85 to 125-ft. candles. Thus, the contrast between these two levels will not be too great. Remember, however, to allow about 50% more lighting—30-ft. candles instead of 20 and 125-185 instead of 85-125—due to the accumulation of dirt on reflecting surfaces and loss of efficiency of the lamps.

Fluorescent lighting has been found quite satisfactory for inspecting and grading purposes. Diffusing covers or shielding louvres may be used to prevent direct viewing of the lamps.

White lamps are adequate for many operations, but daylight lamps are better for close discrimination of colors.

Experiments seem to indicate that colored lights are not as effective for color sorting, but colored backgrounds, equal to the average of color of the objects, facilitate distinguishing small color differences. Highly colored surroundings are not desirable. Light gray for surroundings is excellent.

FOR DEPENDABILITY

...for consistent product protection
YOU CAN DEPEND UPON J&L STEEL CONTAINERS

Through years of dependable service, J&L Steel Drums and Pails have proved that they meet the most rigid tests for product protection. You can be certain that the product quality your customers expect is thoroughly protected because:

1 J&L Drums and Pails are made from high quality J&L Steel Sheet.

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You can obtain J&L Steel Drums and Pails through plants located in leading industrial centers. You'll find J&L service fast and efficient. Call the J&L office serving your community.

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STEEL CORPORATION — *Pittsburgh*
CONTAINER DIVISION
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The J&L line includes all types of Closures and Finishes. Bright, colorful decorations may be reproduced to your specifications. Heavy-duty ICC Drums. Light-gauge Drums. 55, 30 and 15 gal. capacity and 100-lb. Grease Drums. Lightweight Drums for Chemical and Powdered Materials. 1-10 gal. capacity Steel Pails for Foods, Chemicals, Oils.

For more information, use coupon on page 175.

Of course, walls and ceilings should

Here we go--doing two things advertising experts frown on!

We thought we'd never run a picture of our plants in an ad.

Not us. Generally, we're too busy telling food processors what wonderful things Huron MSG and HVP can do for *their* products. But here it is — factory, chimneys and all.

Why? Because, as the oldest producer of MSG in this country, we felt it was high time to show our users we too have a big modern plant, capable of meeting their needs for protein derivatives.

As a matter of fact, we started the whole thing in this country. We worked out the means of making glutamates from wholesome, nutritious wheat, the richest natural source of glutamic acid. We've kept on quietly making our taste-improving products; we've grown as the food industries have prospered.

Second, we never thought we'd run pictures of Huron's "founding fathers". Yet here we go — meet Huron's A. Jarvis Patten.

Mr. Patten is the distinguished protein chemist who first worked out the highly complex procedure for making MSG on a commercial scale in this country. If there's ever a Hall of Fame for the food industries, we think you'll agree Mr. Patten deserves a niche there.

A third thing, though, we can't *show* here. That's Huron's wealth of technical experience. Through the years we've built up a technical service group second to none. Having longer experience than any other manufacturer of MSG, we've amassed a vast fund of technical data on its use. The answers to most of the questions processors want to know are in our files right now.

For MSG that's consistently top-quality, made by the American pioneers in protein derivatives, for practical, usable technical information on how you can improve your products with them, look first to Huron. Huron Milling Company, 9 Park Place, New York 7, N.Y.

Huron MSG

PURE MONOSODIUM GLUTAMATE 99+%

Made by the pioneers in protein derivatives

FACTORIES: Harbor Beach, Michigan

SALES OFFICES: 161 E. Grand Avenue, Chicago 11 • 13 E. Eighth Street, Cincinnati 2 • 383 Brannan Street, San Francisco 7

For more information, use coupon on page 175.

Of course, walls and ceilings should be re-painted often enough to keep their reflectance up to par. Ceilings are important where indirect lighting is employed.

Making a Honey Spread

Question—Do you have any information on the preparation of a creamed honey spread?

Answer — Experiments conducted about 20 years ago at the University of Illinois dairy revealed that a cream testing 70-80% butterfat was required. Honey was first heated to 155 deg. F., or higher, and then 40-45% was mixed with fresh separated cream. Mixing was carefully carried out to prevent incorporation of air into the batch. Product was then packaged and held at 40 deg. F.

At this temperature, the spread did not become rancid. However, it did take on a tallowy flavor within 3 weeks. Heating the honey was important to prevent rancidity.

Tank Trucks for Barrels

—*Continued from page 125*

These cherries are Orchard Run, unstemmed and unpitted fruit. Brining in SO_2 solution is done by the Willamette Cherry Growers Assn. in the usual manner in the 12,000-gal. tanks. Normal storage times in brine is allowed before shipment to San Francisco.

Loading the Trucks

In operation, a "cushion" of SO_2 brine solution is pumped into the stainless steel tank and trailer unit and the equipment tared. Cherries are then pumped from the 12,000-gal. tanks over a "separator" grid, from which excess brine is returned to the tanks. And the drained cherries are chuted into the truck's compartments.

Both truck and trailer units are comprised of three separate compartments. The total truck-load is equivalent to about 110 barrels (250 lb. net each) of cherries. After complete filling of the compartments, the load is again weighed to determine the net weight of the fruit. Then sufficient brine is added to prevent bruising of fruit in transit.

The pumping unit consists of a 3-in. bronze Fairbanks-Morse Series 5420K food handling pump, driven by a 2-hp. variable speed motor. Loading is carried out in 2½ to 3 hr. by a crew of three men. Two of the men are at the pump and tank, and the

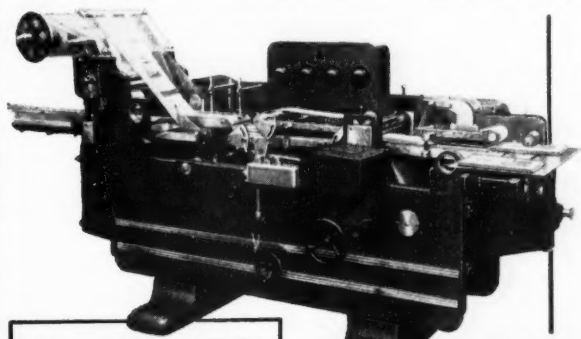
IS YOUR *Packaging* IN "APPLE PIE" SALES ORDER?

Automatic HIGH SPEED CAMPBELL WRAPPER —

- Keep pies and cakes oven-fresh
- Package-wraps without crushing
- Speeds up packaging products
- Cuts labor and material costs
- Increases shelf life—customer appeal

Fruit, berry and custard pies . . . frosted or cream filled cakes of endless variety —you can package wrap them all *without damage or crush* on the Campbell Wrapper. Our exclusive "float" wrapping method is the reason. You'll speed-up production, too, by packaging *60 and more* individual or large service pies per minute; cakes and cookies from *100 to 300 units per minute* — And, all at lower labor and material cost to you! In most cases, one person operates and tends several machines at the same time, and there's no need for trays or stiffeners *unless desired!* Modern wrap materials of every description for crimp, heat or glue sealing may be used. Plan now to *increase* product production at *lower* packaging costs with this versatile, new, modern wrapping machine.

And---the ideal wrapper for —



COOKIES, CRACKERS AND DONUTS, CANDIES AND CONFECTIONS, PACKAGED FOODS, PREPACKAGED TABLE MEATS, BACON, CHOPS AND PATTIES, ICE CREAM BARS, NOVELTIES, CITRUS FRUITS, VEGETABLES, CHEESE, DAIRY PRODUCTS, HARDWARE, MACHINE PARTS, TISSUES, NAPKINS, TOWELS, PAPER AND CLOTH SPECIALTIES, BANDAGES, SOAPS, PHARMACEUTICALS AND 101 VARIED ITEMS OF REGULAR AND IRREGULAR SHAPE.

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We are contributing to the nation's defense program by providing a large part of our increased production facilities for building precision armaments. Civilian orders are filled on a reasonable time basis only.

New Free Booklet
Describes and illustrates how the Campbell Wrapper packages many nationally known products.

Campbell WRAPPER
HUDSON-SHARP MACHINE CO. • GREEN BAY, WIS.
Manufacturers of Aniline and Gravure Presses, Folders, Interfolders, Laminators, Waxers, Embossers, Slitters, Sheeters, Roll Winders, Packaging Machines, Creepers and Tissue Converting Units.

New York office: 55 W. 42nd St.

For more information, use coupon on page 175.

truck driver handles flow into truck.

On arrival at destination, the truck is positioned beside the receiving unit and additional brine of the same composition as that in the truck is pumped into its compartments. This additional brine provides the excess liquid needed for pumping.

The same type of pumping unit is used for unloading as for loading the trucks. A hose from the suction side of the unit is attached to the tank outlet at the bottom of the truck. Fruit is pumped over a stainless steel separator grid, from which excess brine is recovered and stored in an auxiliary 500-gal. tank.

Cherries are chuted into wooden barrels, then moved to the processing department located on one of the upper floors of the building. The fruit is covered with enough brine to prevent spoilage. But the barrels are not closed, since fruit immediately goes into process. Unloading time is about the same as loading time—2½ to 3 hr. Three men handle the operation.

End (*Resume reading on page 127*)

Practical Labor Pointers

—*Continued from page 69*

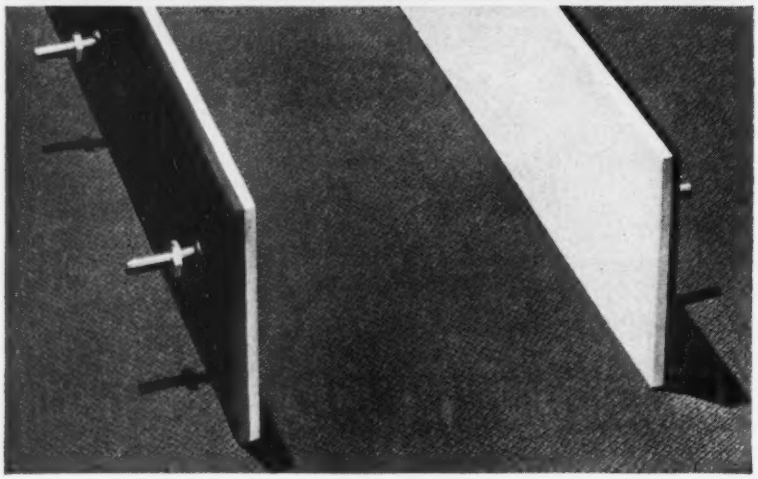
If a company is to survive in a period of stiff competition, price cutting, and great customer discrimination, it cannot afford crippling costs. Therefore, as the price of any concession it may make, management must insist on improved guarantees of quality, productivity, cost reduction, and other operating economies.

Due to the change in economic climate, the union pressure for wage increases will diminish, even though initial bargaining demands in this area will not be modest. There will, however, be a willingness to trade off for job security benefits. Therefore, fringe benefits mark the area of greatest concern in this year's administration of the overall industrial relations program.

Unions will try to tighten provisions covering job standards, work assignments, seniority, transfer and layoff, and the like. They will press for an increased number of paid holidays, liberalization of paid sick leave policies, severance pay, more union participation in time-study programs, and improved health and welfare programs, including higher benefits, lower employee contributions, increased surgical and medical allowances, extension of benefits to retired employees and dependents, and catastrophe insurance.

Before the day that this year's bargaining starts, be prepared with facts regarding all of these "benefits".

Slippery, Clean TEFLON aids Food Production



Conveyor Guide Rails Protect Products and Packages

Now, metal guide rails on conveyors that formerly marred bakery, confectionery and other food products can be replaced with TEFLON-faced guide rails—the most anti-hesive surfaces known. And TEFLON is chemically inert, tasteless, odorless, easy to clean, non-absorbent, bacteria resistant, non-contaminating—the cleanest material you can use in a food plant.

In handling package goods, too, its slippery, clean surface prevents streaking packages that must be fresh and appetizing for dealers' shelves.

You will want to know how some of the largest and most successful food manufacturers are using duPont TEFLON Guide Rails, work surfaces, etc. fabricated by United States Gasket Company.

Guide rails are fabricated in any length up to 12 feet long. Widths are from ½" up to 2½" in ¼" increments. One-eighth inch TEFLON is bonded on one-eighth inch steel bar by a special patented, U.S. Gasket technique and shot welded studs are applied at designated points for fastening to present conveyor equipment. The TEFLON surface remains unmarred. Special shape guide rails are also available to specification.

Write for further information.

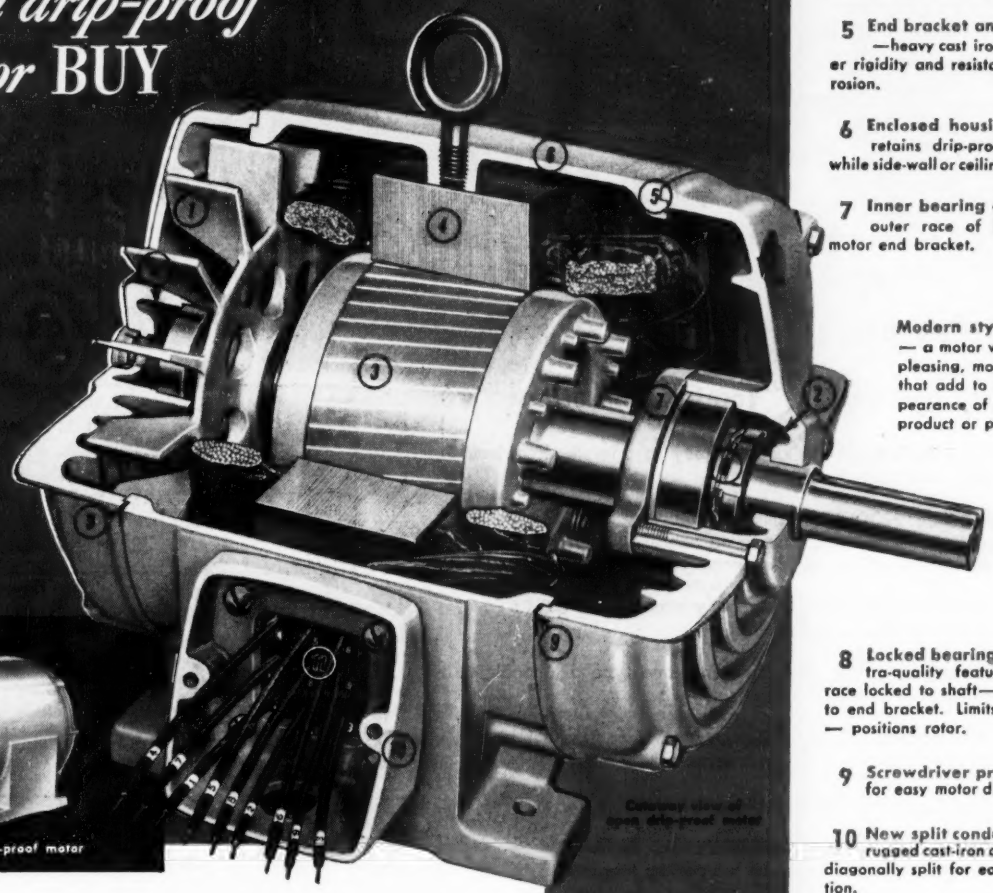
UNITED STATES GASKET COMPANY

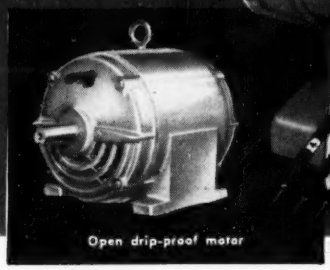
CAMDEN 1 • NEW JERSEY

FABRICATORS OF duPont TEFLON, Kellogg KEL-F AND OTHER PLASTICS

Representatives in Principal Cities Throughout the World

Here's the inside story of the
NEW L.A. *Line*
...your BEST *open drip-proof motor* BUY




Open drip-proof motor

Here is the new L.A. open drip-proof motor. It's completely redesigned inside and out to meet new NEMA standards. You get the advantages of Louis Allis's 52 years of motor building experience.

This motor is better protected, more drip-proof . . . has new bearing construction and improved insulation. Learn about these and the many other features of the new L.A. Line. Call your nearby Louis Allis Sales Engineer for information on this and our complete motor line.

THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

LA-104

1 **Fan** — efficient, non-sparking fan. New aerodynamic design for more effective cooling.

2 **Large grease chamber** — factory lubricated for years of attention-free service.

3 **Indestructible cast-aluminum rotor** — dynamically balanced with fan for smooth, quiet operation.

4 **Stator** — prewound stator core utilizes Formvar wire insulated with a new Alkyd Asphalt Resin insulating varnish.

5 **End bracket and housing** —heavy cast iron for greater rigidity and resistance to corrosion.

6 **Enclosed housing** —motor retains drip-proof features while side-wall or ceiling mounted.

7 **Inner bearing cap** – locks outer race of bearing to motor end bracket.

Modern styling — a motor with pleasing, modern lines that add to the appearance of your product or plant.

8 **Locked bearing** — an extra-quality feature. Inner race locked to shaft—outer race to end bracket. Limits end play — positions rotor.

9 **Screwdriver pry slots** — for easy motor disassembly.

10 **New split conduit box**— rugged cast-iron conduit box diagonally split for easy connection.

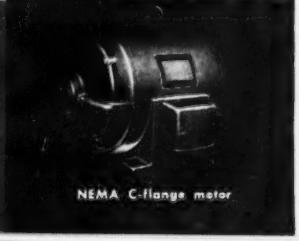
11 **Lead identification** — permanent, positive lead identification spacer in conduit box plus lead tagging.

NEMA D-flange motor

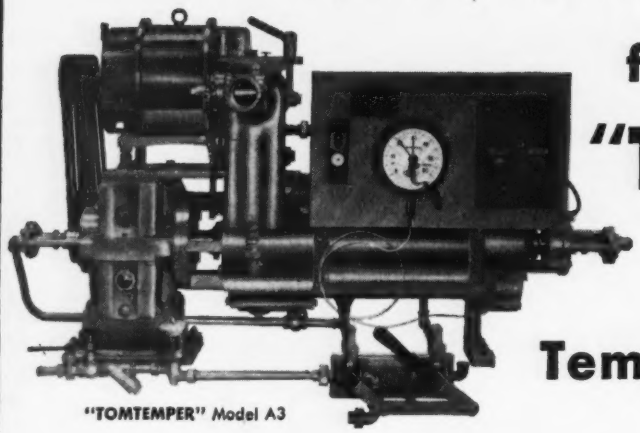
Vertical NEMA C-flange motor

We specialize in SPECIAL MOTORS *and* PROMPT DELIVERY, TOO

There's a Louis Allis special motor that does your toughest jobs better. Whatever electrical or mechanical modifications you need, check Louis Allis first.


NEMA C-flange motor

Revolutionary...



"TOMTEMPER" Model A3

fully automatic "Tomtemper" Chocolate Tempering Machine

It Guarantees More Attractive Finish – Finer Fracture – Better Taste

JUST LOOK WHAT THE **"Tomtemper"** OFFERS:

FULLY AUTOMATIC OPERATION Easy to operate. Requires only one adjustment.

MINIMUM PROCESSING TIME Combines undercooling with intense mechanical mixing to achieve ideal tempering cycle at lowest possible viscosity.

FAST START UP Delivers correctly tempered chocolate less than 4 minutes after starting.

FAST CHANGEOVER Switches from one type of chocolate to another in 3 to 5 minutes.

HIGH OUTPUT Up to 3600 pounds of chocolate per hour; 5000 pounds per hour with accessory cooling.

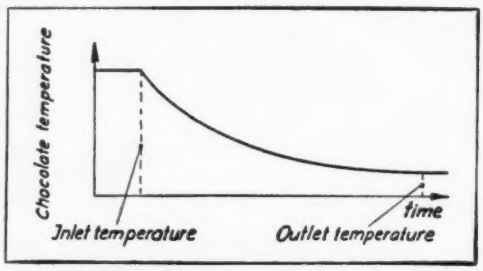
SMALL SIZE Measures approximately 47" x 22" x 20".

ABSOLUTELY HOMOGENEOUS TEMPERING Exposes every particle of chocolate to same tempering treatment.

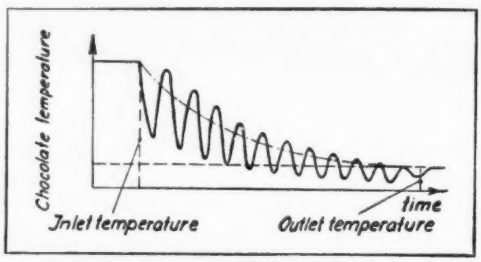
GUARANTEED ACCURACY within ± .9°F of desired temp.

And these are but a few of the many outstanding features offered by the *"Tomtemper."*

"TOMTEMPER" Thin-Film Tempering Machines are manufactured by TOM'S Laboratory LTD. which also manufactures a line of Fancy Molding Plants and Chocolate Chip Making Machines.



AVERAGE TEMPERATURE of chocolate as it progresses through the *"Tomtemper"* is shown above.



UNDERCOOLING AND MIXING Graph above shows how *"Tomtemper"* achieves the outlet temperature by undercooling and mixing.

GEVEKE & COMPANY, INC.

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MANUFACTURERS' REPRESENTATIVES • SPECIALIZED MACHINERY AND EQUIPMENT • FOUNDED AMSTERDAM 1876 •

This year something new is being added to union demands. There will be an attempt to restrict or prevent the transfer of operations to other localities. Even though you foresee no such move on the part of your management, nevertheless be careful that you don't innocently clip your own wings and bar forever the possibility of necessary flight occasioned by competitive pressures.

It was further suggested by Mr. Kissock that management be on the alert for every infringement on the rights to manage, which would be doubly binding from here on in. Don't overlook the efforts of unions to administer and control fringe-benefit funds.

In considering fringe concessions, fundamental factors are the question of cost and the question of principle. The latter should be approached from three perspectives: (1) Is it the *right* thing to do—is it good for our employees, for our stockholders, and for our management? (2) Also important is the matter of precedent and the establishment of trend or practice which can have serious implications on your community and to your industry, or a segment of your industry. And (3) the application of a concession to the individual company's job structure and productive efficiency.

Once any concessions are made they continually should be merchandised to employees. Your company's good deeds will not get proper recognition either at the bargaining table or throughout the contract year—unless your communications to and with your employees bring a realization and a desire on their part to count their blessings.

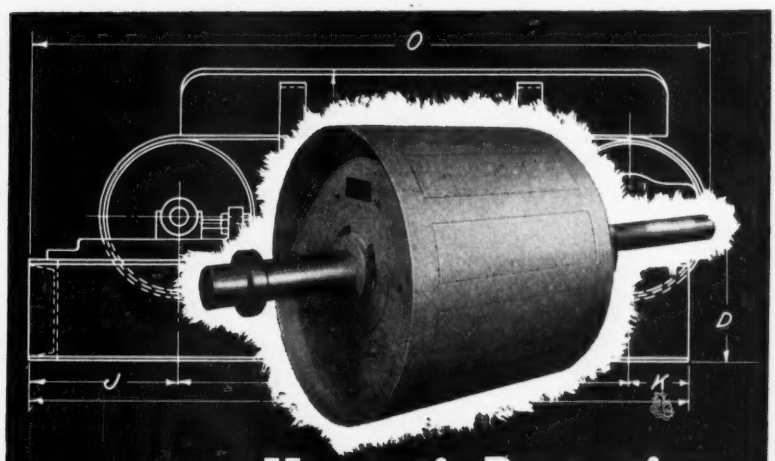
Taft-Hartley Aspects

There is no real need for amendment of the Taft-Hartley Act. And in any event, amendment is not likely this year. These opinions were expressed by Charles M. Brooks, director of industrial relations, the Texas Co.

"The statute as now written has done an excellent job in improving and stabilizing labor-management relations, and no case has been made out by any group to prove that there is a real need for substantial amendment to the statute," Mr. Brooks declared. "Rather, it seems that the law merits further trial under a sympathetic administration."

Recent opinion surveys indicate that only about 25% of all employees in the country feel the law should be repealed or substantially modified, he reported. "No political pressure is being exerted by employees, collectively or individually."

There also seems, he said, to be



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When you specify a powerful, solidly built Stearns permanent magnetic pulley for tramp iron removal, you get protection that's tailored exactly to your plant and product. Here's why:

First, Stearns magnetic specialists study every aspect of your installation . . . size of conveyor belt . . . speed of belt travel . . . size of material . . . depth of material . . . atmospheric conditions . . . available space . . . and many others. Then, Stearns interprets these factors and selects the magnetic pulley that will provide you with maximum plant protection and product purification.

Stearns offers both permanent and electro-magnet pulleys. A word from you places nearly 40 years of research and engineering experience at your disposal. Write for bulletin 350C-1.

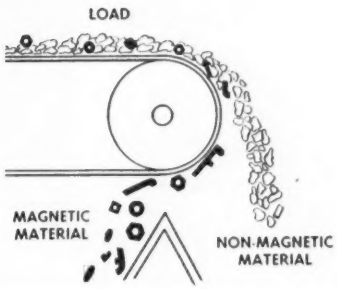

Diagram showing how Stearns magnetic pulley removes tramp iron.

Check These Advantages

- **PULLING POWER** — Design and position of Alnico magnets provide a uniform, powerful pulling force.
- **NO OPERATING EXPENSE** — No current needed. Easy to install. Set it and forget it.
- **OPERATES ANYWHERE** — Inside or out, moist air or dry — Stearns permanent magnets work anywhere.
- **BELT STAYS PUT** — Crown face insures proper belt travel. Special lagging available for conveyors of long centers.

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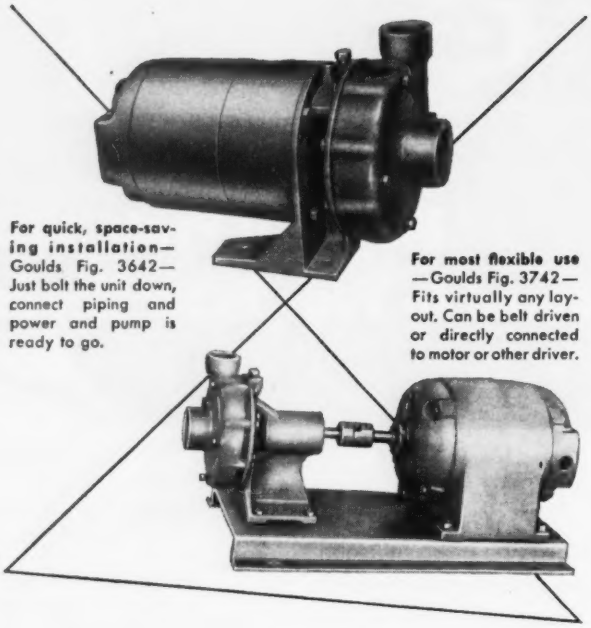
For more information, use coupon on page 175.

Which of these 2 COST-CUTTING GOULDS PUMPS best fits your air conditioning plans?



For quick, space-saving installation—Goulds Fig. 3642—Just bolt the unit down, connect piping and power and pump is ready to go.

For most flexible use—Goulds Fig. 3742—Fits virtually any lay-out. Can be belt driven or directly connected to motor or other driver.

both units have these advantages

EASY TO CONVERT—Just change impeller and casing to convert from one size to another.

SPECIAL DESIGNS—Both units are designed for air conditioning, but both can be used for booster and condensate service, too. Capacities to 110 G.P.M., heads to 120 ft.

QUIET OPERATION—The only moving part is the balanced impeller which assures minimum noise and wear.

NO STUFFING BOX LEAKAGE—Mechanical seal prevents leakage without binding shaft. Requires no adjustment or maintenance.

TROUBLE-FREE SERVICE—Sturdy construction and permanent alignment of moving parts assure long operating life with minimum maintenance.

For full details, specifications, performance curves, send for Bulletins 624-A3 and 625-A3.

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Goulds PUMPS INC. Seneca Falls New York

no noticeable movement by public groups to amend the law. And a recent survey indicated that 81% of the general public feels it has had no effect on them personally.

Employer organizations favor tightening, rather than relaxing, the present act, and "unions are acting as if they would prefer to have the Taft-Hartley Act as an election propaganda device, rather than to have a few minor amendments made."

End (*Resume reading on page 70*)

In-Package Desiccants

—*Continued from page 81*

master Corps. Since experience with this container is limited and there are large variations in the expansion of various lime desiccants, hydration trial of proposed lime desiccants (in conjunction with their proposed container) is recommended before use.

Capacity and Hydration

The following simple, rapid method of estimating capacity and rate of hydration of potential lime desiccants is taken from the QMC specification[7]: Samples of powdered desiccant are hydrated at 75 deg. F. over a saturated sodium bromide solution. Weight increase after a given time is used as a measure of capacity and rate of hydration. A weight increase of 28.5% in 48 hr. indicates desiccants of minimum acceptability.

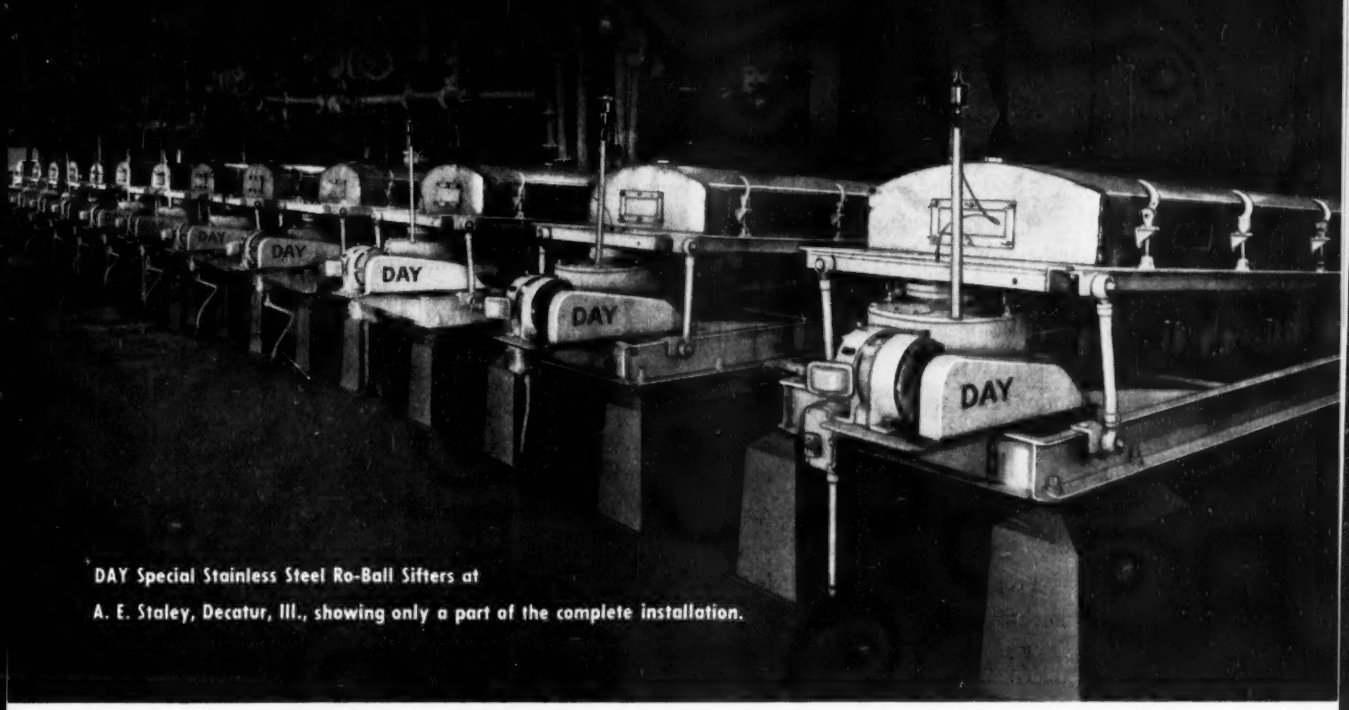
This criterion is arbitrary, and lime samples of lower capacity or slower moisture uptake may prove satisfactory.

Vapor pressure is regulated by the saturated sodium bromide solution at approximately 12.4 mm. of mercury pressure, which corresponds to 55% humidity. This pressure was chosen because lime hydrated at higher vapor pressures has abnormally high capacities.

One sample of lime placed over water at 75 F. for six days increased 49% in weight. This abnormally high increase is evidently due to hemihydrated or monohydrated calcium hydroxides.

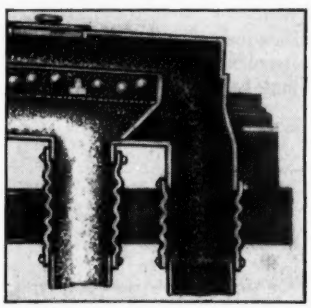
At the vapor pressure of a saturated sodium bromide solution maintained at 75 F., the water sorptive capacity of calcium oxide has been found to be approximately the same as at much lower vapor pressures. This is seen by comparing weight increases of calcined lime samples over saturated solutions of sodium bromide and lithium chloride solutions at 75 F., as shown in Table II and the second and

DAY means longer life span



DAY Special Stainless Steel Ro-Ball Sifters at
A. E. Staley, Decatur, Ill., showing only a part of the complete installation.

✻ Extra long life for your equipment is assured by DAY's unmatched ability to combine rugged construction with precision engineering. An impressive list of users have found this true of the DAY Ro-Ball Sifter, which accomplishes 100% elimination of foreign material and ideal aeration. Key to its outstanding performance is the Super-Active Ball Cleaning Device. Scores of rebound points are provided in each compartment, resulting in even vibration over the entire screen surface. The extremely fine mesh stays clean and open, allowing free passage without crushing or forcing



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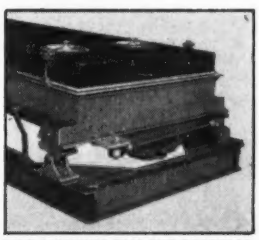

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Puzzled where to buy Vitamin A?

HERE'S HELPFUL INFORMATION

A steady supply of vitamin A, stable in price and free of "fishy" odor and taste is now a fact.

This achievement was made possible by the successful synthesis of vitamin A by the Roche research team headed by Dr. Otto Isler in 1947. This brilliant work opened the door to the economical manufacture of vitamin A. Today, the production of this vitamin at Roche Park is measured in the tons; it is sufficient to supply the needs of the United States and Canada.

Our accomplishment with vitamin A is the latest in a series of vitamin developments with which we have been identified. It is, perhaps, not strange that this is so. Because for years many industries (canning, baking, milling, pharmaceuticals) have regarded us as their headquarters for knowledge about vitamins and for their supply of these essential substances. It is important to you that Roche specializes in the manufacture of vitamins.

You want a source for a sure supply of vitamin A at a price which is not subject to wide fluctuations. You have it at Roche.

You want a high quality product of an unvarying standard. You have it at Roche.

You want your vitamin A to be blended to your specifications to suit your margarine. You have it at Roche in a modern blending and canning plant recently installed for your service.

You want technical assistance on the use of synthetic vitamin A in your margarine. You have it at Roche where technical experts who supplied so much help at the hearings for amended Definitions and Standards of Identity are always at your service.

- Highest quality
- Accurately weighed
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- For Margarine fortification
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May we cordially invite you to use our organization as your source of supply for vitamin A. Your satisfaction is assured.

third graphs. The vapor pressure over the lithium chloride solution is 2.4 mm. of mercury pressure, or about ⅓ the vapor pressure of sodium bromide.

More accurate appraisal of rate of hydration of desiccant under conditions existing during in-package desiccation would be obtained if a lower vapor pressure and a greater quantity of desiccant were used. For example, 1g. of desiccant might be used per sq. cm. of sample container, instead of 0.07g. per sq. cm. And the vapor pressure might be controlled by a saturated lithium chloride instead of saturated sodium bromide solution.

However, such a procedure would require a much longer test period. Since studies of the rate of desiccation have shown that, within limits, the resistance of the desiccant is but a small fraction of the total resistance to desiccation, it appears that sufficient accuracy is obtained by use of the more rapid procedure.

Here are detailed test directions:

Accurately weigh (± 0.005g.) 1.9 to 2.0g. of the ground sample into a sample container, and spread it in a uniform layer over the bottom. Place sample container in desiccator (do not use a single desiccator for more than six samples). Weigh dish and sample after 48 hr., and calculate percent of water absorbed by desiccant (from increase in weight).

Equipment and reagents needed: (1) One or more 250 mm. desiccators, with a sample support made of ¼-in. wire-mesh screen or similar material (in place of regular desiccator plate); (2) 500 ml. of saturated solution of pure sodium bromide, with excess crystals in each resiccator at 75 deg. F.; (3) weighing dishes, 6 cm. dia. and 2 cm. high (2-oz. metal containers for ointments are satisfactory); and (4) suitable temperature control at 75 F.

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8. Cotton, R. H. and Schroeder, A. L. U. S. Patent 2,520,878 (to National Research Corp.) Aug. 29, 1950.
9. Burr, H. K. and Silviera, V. G., *Stabilization of Dehydrated Cabbage by In-Package Desiccation*, (in preparation).

End (Resume reading on page 82)

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New Toledos provide utmost reading convenience for operator . . . help you control costs with greater *speed* and *accuracy*. On all new Toledos with swivel heads the dial can be installed to face any of eight directions in relation to the platform; also with full 360° swivel.
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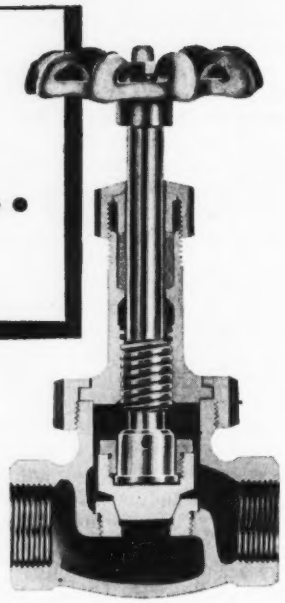
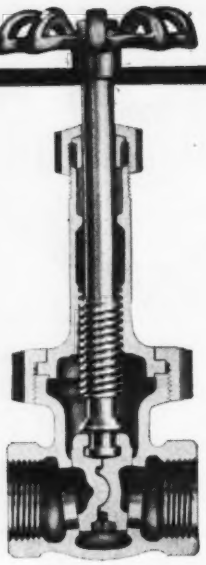
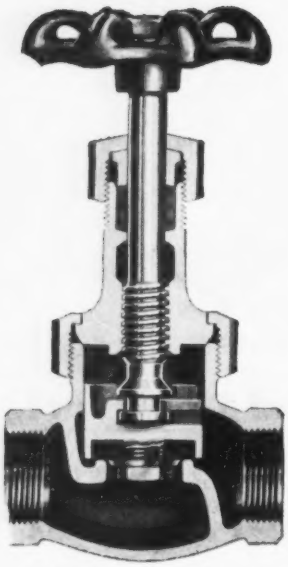
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

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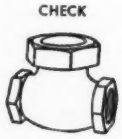


Useful New Books & Government Publications

High-Frequency Heating

INDUCTION AND DIELECTRIC HEATING. *By J. Wesley Cable. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 36. 1954. 576 pages. 6¼x9¼ in., cloth. Price:* $12.50.

Reported as the first book to cover both major methods of high-frequency heating, this work offers up-to-date data on fundamental theory, energy sources, coil and electrode design, construction of jigs and fixtures, and work handling methods. Complete chapters deal with application of dielectric heating in food processing and sterilization.

Containing a wealth of practical information on these cost-saving processing methods, the book is of value to engineers engaged in production, design, and research. It is also of interest to food plant executives to whom it offers a possible solution to specific processing problems.

Non-Tech on Silicones

SILICONES AND THEIR USES. *By Rob Roy McGregor. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36. 1954. 302 pages. 5¾x8¼ in., cloth. Price:* $6.00.

A comparatively new aid to food processing, silicones have helped improve product quality, sanitation, and line maintenance. This book shows why and how. For engineers, designers, and all who are concerned with applications of silicones, book is a source of data on properties, preparation, and applications, offered in a non-technical manner.

Uses of silicones in representative industries—the bread baking industry, for example—is treated in technique and effect.

Processing of Foods

FOOD SELECTION AND PREPARATION. *Fourth Edition. By Marion Deyoe Sweetman and Ingeborg MacKellar. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 1954. 645 pages. 6x8¾ in., cloth. Price:* $6.50.

Revised to conform with current market trends and industry problems, this fourth edition of a comprehensive study of foods and nutrition begins with a treatment of the basic principles of food appraisal, with emphasis on nutritive quality, digestibility, sanitary quality, palatability, and economy. This discussion is not limited to individual foods, but deals also with combinations.

A second section begins the study of food processing, divided into preparation and preservation. Supplementing this is a coverage of food material structure.

The greater part of the book, however, deals with the selection and preservation of food, following the classifications used by the Bureau of Human Nutrition and Home Economics.

Of special interest to processors are chapters on superior sources of vitamins and minerals, effects of storage and cooking on meats and vegetables, canning and freezing, and the effect of major food factors.

Government Publications

BUILDING & EQUIPMENT COSTS, APPLE AND PEAR PACKING. *Mimeographed Report No. 141. Dec. 1952. 38 pages; 8⅜x10¾ in., paper.* Report on efficiency in fruit marketing, dealing with fixed costs for building and equipment. IN-PLANT TRANSPORTATION COSTS AS RELATED TO MATERIALS HANDLING METHODS. *Mimeographed Report No. 142. Jan. 1953. 57 pages; 8⅜x10¾ in., paper.* Report on efficiency in fruit marketing covering transportation of fruit and materials at packing house. Studies made by Giannini Foundation of Agricultural Economics, California Agricultural Experiment Station, and Bureau of Agricultural Economics, USDA. *Published by The College of Agriculture, University of California, Palo Alto, Calif.*

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered directly from the Bureau responsible for its issue.

PROCEEDINGS OF NATIONAL FOOD AND NUTRITION INSTITUTE, DECEMBER 8, 9, 10, 1952. *Agriculture Handbook No. 56, 161 pages. 65 cents.* Includes outline of program, complete text of papers presented at the Institute.

Liquid Sugar Cooling

—*Continued from page 63*

What's more, shaving the ice took part of a worker's time.

There were other objections: Bags took up a considerable amount of space. Sugar had to be scaled, then manually dumped into the water-jacketed mixers. And since less than 100 lb. went into a mixer, some sugar naturally remained in each bag. As a result, spillage was common.

Dual Cooling System

Liquid sugar is delivered to our bakery (from the Yonkers, N. Y., refinery of Refined Syrups & Sugars, Inc.) in stainless steel tank trucks. From the trucks, syrup is pumped into two 3,200-gal., plastic-lined metal tanks in the 1st floor garage area.

As a spoilage-preventive, germicidal lamps have been installed inside each tank, directly above the liquid sugar level. Also, air is fan-circulated through vents to prevent moisture condensation.

To facilitate inventory control, each tank is fitted with an accurate gage and sight glass. And used in conjunction with the two coolers—one for cake mixers and the other for dough mixers—is a high and low level cut-off and warning mechanism.

Two storage tanks are employed for alternate use. Liquid sugar is pumped from one tank until it is empty, and the next one is then cut into the supply system. Meanwhile, the empty tank is refilled.

From storage tanks, liquid sugar is pumped 75 and 150 ft. through 3-in. pipes to the two heat-exchangers of the Flow-Sweet cooling system. These coolers are of the asbestos-insulated, tubular type. Cooler nearest storage tanks supplies cake mixers, and the other feeds dough mixers. Coolers are 2½x3x6 ft. and ceiling-suspended to avoid taking up floor space.

Temperature of the syrup drops from 80-55 deg. F. as it makes a single pass through each Freon-refrigerated heat-exchanger. Capacity of each cooler is about 1,000 gal. hourly.

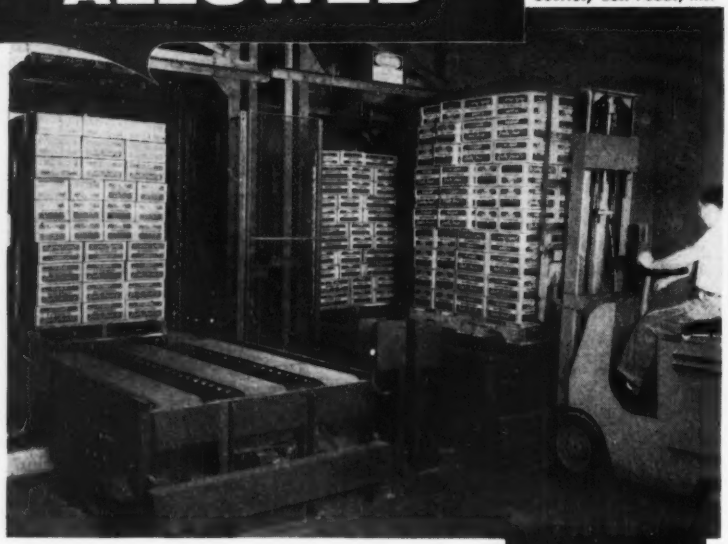
Chilled syrup then feeds into a ceiling-suspended, 120-gal. capacity metal tank adjacent to each cooler. It is then continuously recirculated—except when being metered into mixers—through 1½-in. cork-insulated ceiling-suspended copper pipes to mixers and back to coolers. Distance is about 45 ft. from cooler to cake mixers, and 150 ft. to dough mixers. During recirculation, temperature of the syrup is thermostatically controlled.

Meters are specially calibrated (in pounds) for variations in syrup viscosity, which changes with temperature.

End (*Resume reading on page 64*)

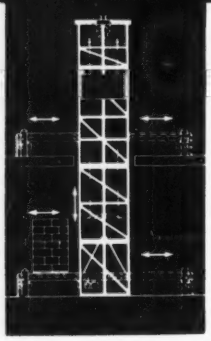
NO PASSENGERS ALLOWED

Courtesy Best Foods, Inc.



RAISING AND LOWERING LOADED PALLETS

Where pallet loads are to be transferred from one level to another, this type of conveyor accomplishes the raising or lowering quickly, safely and automatically. The carrier and stations at all levels are equipped with reversible power units for loading or discharging the pay-load.



At Alvey, every conveyor problem is special. Every system is exactly tailored to your particular needs . . . designed by the conveyor industry's top engineers to reduce costs and speed product handling.

An Alvey Engineer is always available. He will visit your plant and evaluate your problem. Write for appointment.

Every time you **MAN**handle a package, you add to the cost and nothing to the value; therefore, put your packages on Alvey Conveyors that are engineered to fit your individual requirements.

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BRANCH OFFICES IN PRINCIPAL CITIES

ALV 127-B

Quells Separation

—*Continued from page 131*

170 deg. F. Then sufficient syrup was added to a Waring Blendor to cover its blades, the Blendor started, and the weighed amount of thickener slowly added, followed by addition of remainder of syrup and mixing for 1 min.

Mixture was combined carefully with weighed amounts of dry relish (6 parts syrup to 7 parts relish). Finished mixture had a temperature of about 100 deg. F.

Portions (500g) of finished relishes were filled into pint home-canning jars fitted with 2-piece metal lids and covers. Two separate packs were put up, each of which consisted of 6 jars of commercial type, or control relish, and 6 jars of each of the three concentrations of the 7 different thickening agents.

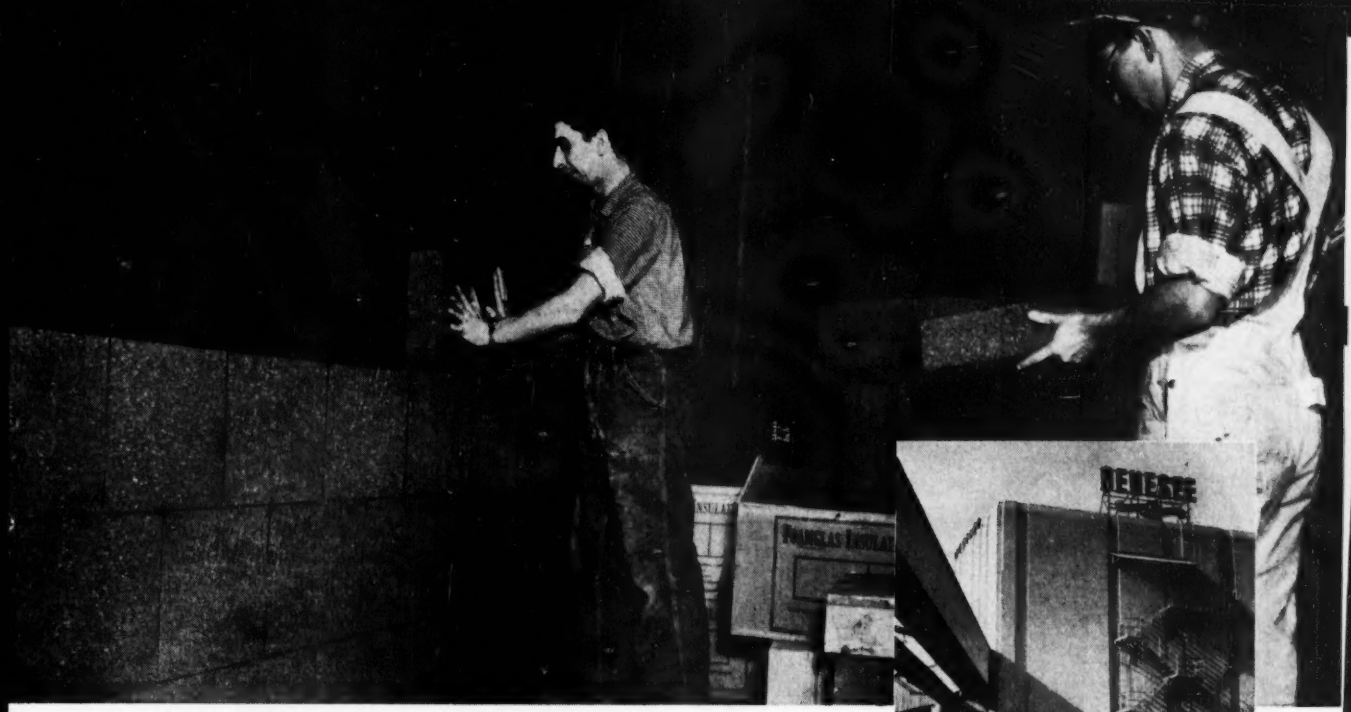
One complete set of packs was stored at room temperature (72 deg. F.) and a second stored at an elevated temperature averaging 113 deg. F. At expiration of 1, 2, 3, 6, and 12 months, one jar from each pack was removed and examined organoleptically, and also checked for titratable acidity, pH, drained weights, and free-flow of liquid.

Each pack was compared with the control for differences in color, odor, and general appearance. Relishes were then shaken onto standard sieves (8-in. dia., 8 meshes per in.), allowed to drain for 2 min., weighed, and percentages of drained weight to fill-in weight determined. Amount of liquid that drained from relishes in the 2-min. interval was also measured and its volume recorded as milliliters of free-flow liquid.

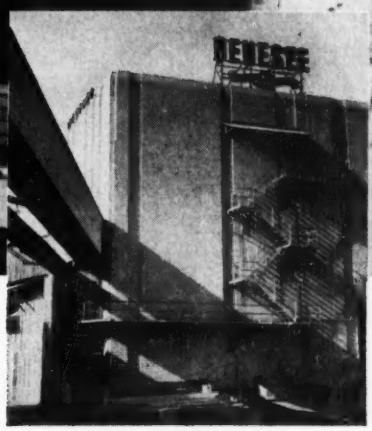
See Improvements, Savings

There was remarkably little difference within a given pack as a result of different concentrations of the same hydrocolloid, of different storage temperatures, or of different storage times. However, there were considerable variations between relish packs prepared with different thickening agents (see Table II).

Hydrocolloids giving highest drained weight values were CMC, Irish moss extractive, and gum tragacanth. Lowest concentrations of the later produced a finished relish of such stiff and gummy texture that it could be shaken from the jar only with difficulty. Thus, although separation of syrup was prevented, finished relish could not be considered acceptable. Lower concentrations of this thickener might be employed successfully.



Lightweight FOAMGLAS blocks are easily installed on walls of Genesee's new storage building.



Exterior of Genesee Brewing Company's new four story storage building, built in 1950 of concrete block construction. All insulation is FOAMGLAS . . . on exterior walls, roof plus an insulated fermenting room inside.

"We insulate with FOAMGLAS because it stays dry!"

states Lloyd B. Welch, Plant Engineer, Genesee Brewing Company

Mr. Welch points to one of many spots at which old insulation failed completely.

"FOAMGLAS plays a leading role in our plant expansion program because it *stays dry* to maintain constant insulating efficiency," reports Lloyd B. Welch, plant engineer at Genesee Brewing Company, Inc., Rochester, N.Y. "The strong, rigid, cellular glass blocks of FOAMGLAS enable us to use them in *free standing* construction permitting use of our insulated spaces while other construction work is still in progress."

Mr. Welch continues: "Our old insulation absorbed moisture and failed, but this presents no problem with FOAMGLAS which is impervious even to the heavy vapor concentration in the fermenting room of our storage building. There FOAMGLAS helps us maintain desired temperatures (generally 33° F.) with minimum maintenance to equipment and structure.

"With FOAMGLAS giving complete satisfaction in one storage building and a hops storage room, we'll definitely use it in a new storage building to be erected soon. We will continue to take full advantage of outstanding benefits from FOAMGLAS."

You, too, can do a better insulating job with moisture-proof, rat-proof, fireproof FOAMGLAS, the strong, rigid insulation that will give you long-lasting insulation service *plus* unique design advantages. Send now for our new booklets describing the use of FOAMGLAS for roofs, walls, ceilings, floors, piping and equipment. Use the handy coupon conveniently located below.

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FOAMGLAS®

the cellular, stay-dry insulation

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Please send me a free sample and the following brand new FOAMGLAS literature:

- ☐ New booklet on FOAMGLAS building insulation.
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There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY
313 WILSON, SO. NORWALK, CONN.

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KANE VERTICAL
GAS-FIRED BOILER

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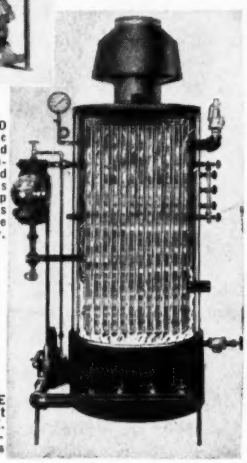
The KANE BOILER PACKAGE includes: the correctly sized Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

"Engineered Steam at its best, with over 50 years of experience at your disposal!"

Full details in new KANE Bulletin, No. 2K.



The M-K-O Automatic Boiler Feed returns condensate and supplies make-up water as needed to the KANE boiler.

The KANE Boiler, built to A.S.M.E. specifications, in sizes to 30 H.P.

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DIVISION OF S.T. JOHNSON CO.

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Packs prepared with CMC and Irish moss extractive produced more desirable relishes than the controls. Here drained weight values averaged 96.8 and 98.9%, respectively, whereas those for controls averaged about 92%. It was observed that when the relishes containing either of the above thickeners were placed on flat grading trays, they appeared less dry and brighter in color than controls. This is probably attributable to increased total syrup retention and, more specifically, to the thicker film of syrup surrounding each particle of relish.

By eliminating syrup separation from those relishes containing the above thickeners, it would be reasonable to expect that a more uniformly flavored sweet relish would result. Relating the amount of separated syrup to the amount of ingoing syrup rather than to weight of finished relish, it may be observed that more than 17% of the original syrup separated out of the control. Thus, if this relish is spiced to a satisfactory degree, syrups containing thickeners could be spiced somewhat less, with a consequent saving in flavoring cost.

Gelatin appeared undesirable as a thickening agent for several reasons. Incorporation of 1 to 2% gave drained weights averaging 90.9%—slightly less than controls. In addition, texture of gelatin packs was judged excessively "soupy." It appears that at the pH of the relish (3.1), gelling ability was rapidly reduced because of hydrolysis.

Addition of 0.25 to 0.75% pectin, although not adversely affecting the flavor or texture of the relish, caused only a slight increase in average drained weight over the controls. Therefore, this addition probably would not be considered economically feasible.

Relishes containing 1 to 4% waxy maize and modified tapioca starches gave drained weights somewhat greater than control packs, averaging 95.9 and 94.3, respectively. Color of finished relishes was considerably lighter than controls, and texture was less desirable because of a dry mouthfeel. Incorporation of 4% of these thickeners adversely affected both flavor and odor of the relishes.

With acidity of free-flow liquid of control relishes averaging 2% acetic acid, the various hydrocolloids produced little change—from a low of 1.9 to a high of 2.1%.

Most pH values approximated those of controls (3.1), although 2% gelatin gave a value of 3.5.

Above feature is Contribution No. 940 of the Massachusetts Agricultural Experiment Station.

End *(Resume reading on page 133)*

Is Contamination Cutting your Product's Quality?

Quality, so important to food processors, is very often lowered by contamination from airborne bacteria and mold. Unchecked, these invisible enemies cost you money in scrapping, lost profits, and dissatisfied customers. Food exposed for even a fraction of a second can become contaminated. Yet, contamination can be reduced by WESTINGHOUSE STERILAMPS. These lamps produce germicidal ultraviolet rays that destroy bacteria and keep product quality high.

If contamination by airborne bacteria or mold is lowering the quality of *your* product, there is a simple, complete solution to your problem in WESTINGHOUSE STERILAMPS. In just a few minutes, you can find out how WESTINGHOUSE STERILAMPS can fit your specific needs. Simply clip the coupon and send it in today.

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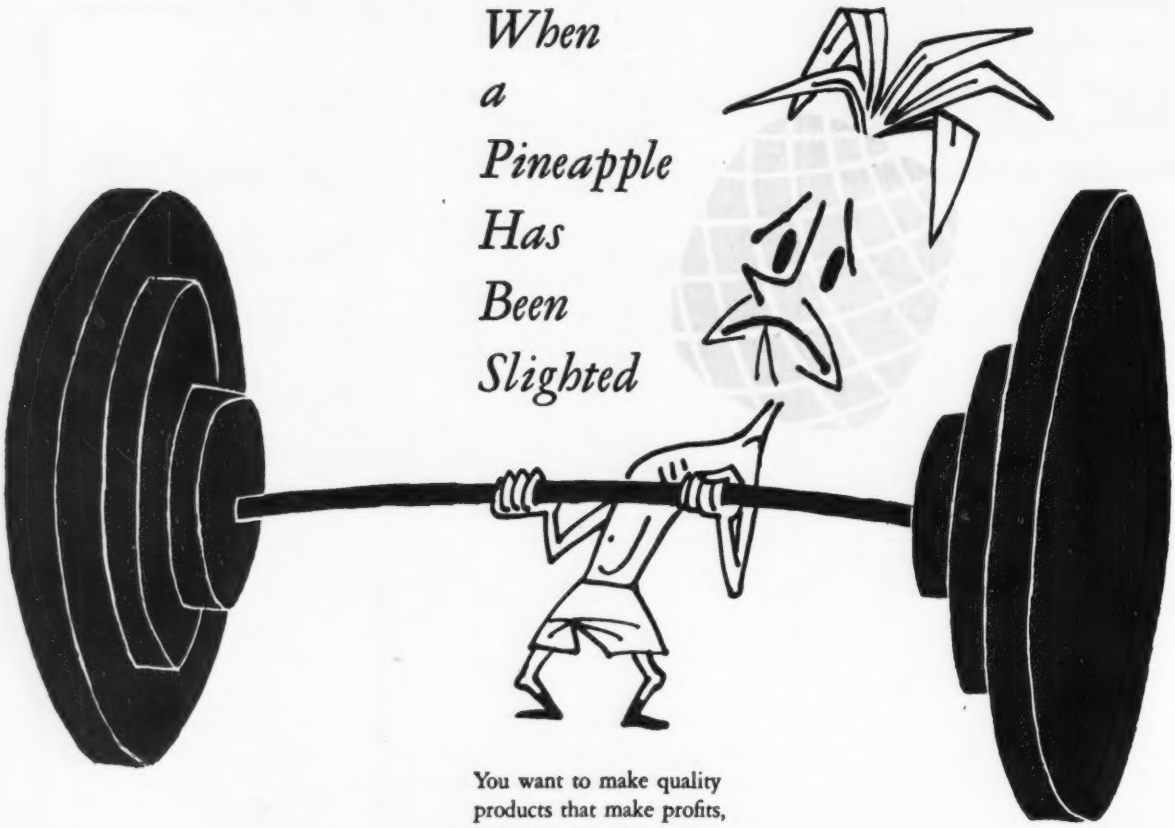

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KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

High Supplies, Demand

Food supplies for the first part of 1954 are noted by USDA as generally high, with retail prices expected to average out as substantially the same as last year. And foreseen is continued strong civilian demand for food, despite the ease-off in economic activity.

Meanwhile, individual-item changes are spotlighted by USDA's publication, *The National Food Situation*. Somewhat less available will be meat, fishery products, lard and fresh vegetables.

But increases are likely for chickens, eggs, manufactured dairy products, vegetable and shortenings, compared with the same period of '53. Further, more fresh and processed fruit, canned vegetables, potatoes, and sweet potatoes have been on hand.

Mix for Mex Foods

New popularity of Mexican type foods is seen promoted by the recent perfection of a prepared-mix type of flour for making tortillas. Developed by Armour Research Foundation of IIT, Chicago, product initially is being retailed in Southwest by Quaker Oats under brand name, Masa Harina (Spanish for flour dough). It also simplifies preparation of such other Mexican foods as tamales, corn chips, enchiladas, and tostadas.

Coumarin Out June 1

Exceptions to Nov. 3 tentative order banning use of coumarin in cacao products, have been disallowed by FDA.

On Mar. 4, FDA amended the definition of standards of identity for various cacao products to repeal all provisions making coumarin an optional ingredient, order to become effective in 90 days.

New ASBE Leaders

Following are new officers elected for '54 by members of the American Society of Bakery Engineers in their recent meeting in Chicago: President, Wallace K. Swanson, Williamsport, Pa.; 1st v.-p., Martin Eisenstaedt, Philadelphia; 2nd v.-p., Jones E. Mapes, Rockville Center, L. I., N. Y., and 3rd v.-p., Arthur G. Hackett, Hollis, L. I., N. Y.

FTC Moves Against 8 Food Concerns Charging Unfair Competitive Tactics

The Eisenhower Administration now has begun its first major antitrust suit in the food industry. In a series of complaints announced March 1 by the Republican Federal Trade Commission, eight major ice cream makers, and their 55 subsidiaries, are charged with using unfair methods of competition to induce dealers to drop competing frozen products and handle their line on an exclusive basis.

The complaints charge that the impact of these practices on a nationwide basis have a monopolistic impact on the whopping, billion-dollar-a-year ice cream industry.

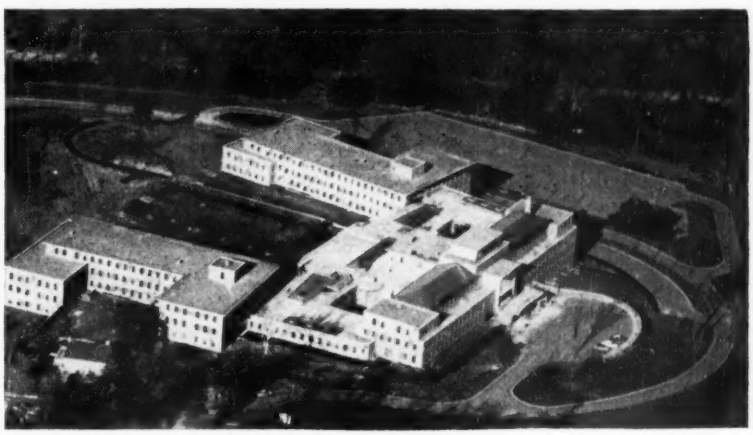
The eight firms named, with their estimated percentage share of 1951 national sales of frozen products are: National Dairy Products Corp. (14%); The Borden Co. (10%); Beatrice Foods Co. (4%); Pet Milk Co. (2%); Arden Farms Co. (2%); Carnation Co. (1.7%); Fairmont Foods Co. (1.6%); and Foremost Dairies, Inc. (1.3%).

This new case is in line with earlier antitrust developments under the current Administration. Since antitrust is largely made up of court interpretations of the laws, the kind of cases set the tone of administration policy.

The Republicans have had to break a new trail in enforcing the antimerger law toughened up by Congress in 1950. FTC has just started a new antimerger case, charging that Crown Zellerbach Corp. violated the law by taking over the St. Helens Pulp & Paper Co. last June. In the only other antimerger case so far, begun by the Democratic FTC, the new commission has ruled that Pillsbury Mills must explain away the competitive effects of buying up Ballard & Ballard Co. and Duff's Baking Mix—or risk an order requiring divestment.

At least one Justice Department antimerger suit is in preparation. But Attorney General Brownell would like to test the new law by stopping a proposed merger with a court injunction, rather than try unscrambling companies after a merger is completed.

The complaints filed against the ice



GF in New Suburban Home

Grand exodus of General Foods Corp.—from old three-building headquarters in mid-Manhattan, New York City, to this imposing structure in campus-like setting at 250 North St., White Plains, Westchester, N. Y.—is now complete. New 357,000-sq. ft. layout, 25 miles from metropolis, is seen in pre-spring air view. Move was made to consolidate facilities under one roof in spacious uncongested area. Ultra-modern building may be expanded as needed. Floors are served by 4 elevators and 16 banks of moving stairways. Features include air conditioning, latest fluorescent lighting recessed in sound-proofed ceilings, large employee cafeteria plus separate dining rooms, lounge and recreation room, and full medical department. Besides commodious general offices there are fully equipped home-type test kitchens glass paneled for observation by visitors.

New Bill on Additives Re-Snags the Issues

A meeting to discuss a possible inter-industry compromise on food additive legislation was held in Washington Mar. 17. But chances of true harmony were almost shattered when, on the day before the meeting, Congressman Joseph O'Hara (Minn.) introduced an additive bill (H.R. 8418) quite similar to an earlier legislative draft prepared by the miller-bakers-meat group, one faction invited to the joint meeting.

▶ **Perhaps the only thing now completely sure: New food-additive legislation will not be passed this session.**

The O'Hara proposal requires that a new additive not be poisonous or deleterious "for its intended use." This supposedly would call for FDA to set quantitative limits for any additive. As such it would be a concession to chemical industry people, who have considered previous approaches unworkable in proposing that manufacturers prove their materials not poisonous or deleterious in any possible use-quantity.

Despite the O'Hara move, the compromise legislative group held a cordial meeting. However, some of those present felt the best course is to adapt the O'Hara measure, while others held that their groups' viewpoints should first be expressed in separate bills, compromise coming later.

---

cream makers will not blaze any anti-trust trails. They are directed primarily at alleged exclusive dealing contracts, which traditionally have been held illegal by the courts. But they do attack business practices which have been common for many years.

Underneath, the theory of FTC lawyers is that the alleged unfair practices are contributing to a gradual increase in the concentration of ownership of production facilities in the hands of a comparatively few big corporations.

They point to volume of production and sales of frozen dairy products zooming from less than 150,000,000 gal. in 1920 to almost 650,000,000 gal. in 1951. But number of establishments making such products decreased in that time from 2,427 to 1,521.

FTC economists argue that the alleged unfair methods of competition are fine for the big, wealthy companies, but really are hurting lesser concerns with only limited capital. Many small manufacturers, says FTC, have been forced to try to meet this competition, but instead of succeeding have had to sell out to the larger companies or go into bankruptcy.

Charges Detailed

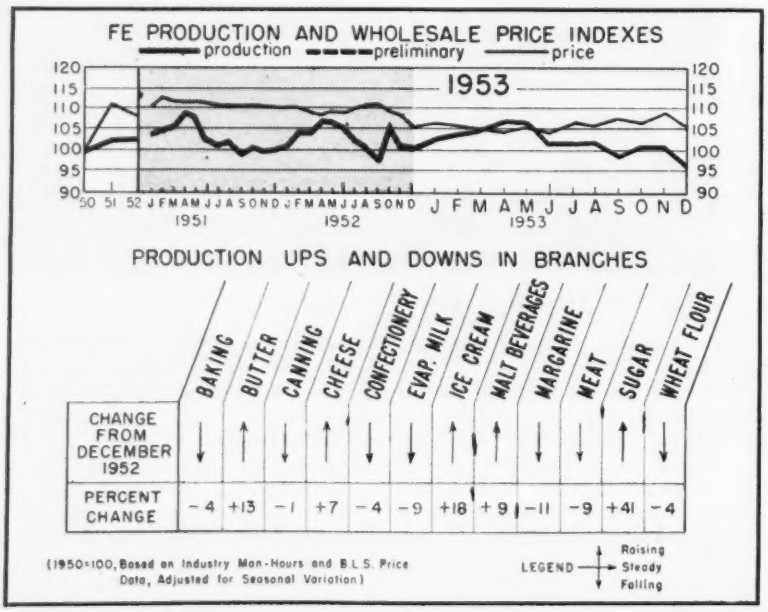
Specifically, the food companies are charged with the following practices based on the condition that the retailers in question refuse to handle competing products:

▶ Supplying dealers with refrigeration units below cost for display and sale of ice cream . . . Making loans to dealers for purchase of such facilities, or for general operating expenses . . . Supplying dealers with other equipment below cost, such as soda fountains and store fixtures . . . Furnishing other services below cost, such as repainting interiors or servicing units . . . Granting discounts and rebates on a volume basis greater than savings in cost and large enough to induce retailers to prefer their products . . . Making money payments (rebates or discounts) on products sold to dealers who own their refrigeration units.

A hearing on each of the eight complaints already has been scheduled by FTC, each at a different time and place. Each company was given 20 days to answer the complaint—either admit or deny. Though each complaint is identical on the important particulars, it's possible one or more cases could be settled independently of the others. But more likely all will be handled together.

Those in other branches of the frozen food field are watching the developments with anxious eyes. Looming over all is the matter of availability of enough refrigeration space—which constitutes a growing problem. With fruits and vegetables, however, the push likely centers on getting additional space in the big chains—which do, by far, the biggest sales job—rather than on encouraging smaller stores to open new frozen food lines.

It may be that a decision in the ice cream case making illegal any system whereby the owner of a refrigeration unit is able to dictate the brand to be sold would have more importance to the juice industry, where special dispensers key the distribution.



Cites Coffee Crop Damage

Brazilian coffee trees suffered so much from frost in '53 that exportable production of beans has had to be revised downward from 16,170 million bags to 14,006. So declares C. G. Lindsay, manager of the Pan-American Coffee Bureau, New York City.

Quoting figures of the Brazilian Coffee Institute, Mr. Lindsay says further that a potential shortage of a million bags also looms for 1954-55.

Refuting charges that supplies have been held off the market, he points to an actual rise in U. S. imports in the 1952-54 period.

Particularly decried by Mr. Lindsay are "loose statements" favoring a coffee boycott as a move against high prices. Thus invited, he says, is retaliation by the coffee producing countries against U. S. goods, hurting many of our companies serving the Latin American market.

Meanwhile, others say coffee growing continues to be hobbled by old, inefficient methods. These people call for a broad program to introduce 20th Century techniques.

New FDA "Rewrite"?

A 90-page recodification of the Food & Drug Laws—third such measure submitted in the last six years—is expected to go to the House of Representatives sometime in May.

Question still unresolved is whether such a move would entail substantive changes in the law. On this score, study of the draft by the House Judiciary Committee is awaited.

Should controversial changes thus arise, the measure would have no chance. But FDA, industry groups, and legal authorities think the bill (H. R. 8221) has possibilities if no major objections are encountered.

Seemingly small items can torpedo such a bill. Insertion by the Judiciary Committee of the word "records" did just that in the matter of revising factory inspection provisions of the law—for drug groups felt prescription files might be held to be records.

Hors d'Oeuvres

▶ In calories per pound, the 1,794 level of sugar is about half that of butter. Reach for a sweet instead of a fat.

▶ Stale bread returns would feed a city the size of Philadelphia. To make it worse, bakers face a 5-day work week. Maybe bakery progress will have to be frozen.

▶ Frozen concentrate is reviving the old American custom of lemonade in the summer. So it's can opener vs. bottle opener for the well-known pause that refreshes.

▶ Latest in re-use containers is a pillow case containing 25 lb. of flour. We suppose baking powder is added for light sleepers.

▶ Round steak was 16c. higher in '53 than in '47. But wage rates were up 52c. That's why we've been headin' for a vast roundup.

▶ The tiny zooplankton in the sea is a potential source of food. It tastes something like shrimp. In size, it is a "little shrimp" indeed.

▶ A new repellent will keep salmon from swimming up the wrong stream. The stuff is found in the skin of human hands—And some people think fish are offensive.

▶ Huels Chemical Works in Germany has made synthetic rubber from French red wine. Another sad case of "butter economics."

▶ It's OK to bet that you're right "or you'll eat your shirt." Burn the cloth and sprinkle the ashes on a juicy steak. Better wear a white shirt. Textile dyes aren't edible.

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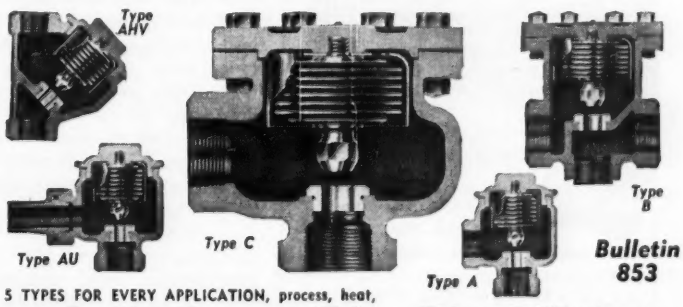

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Bakery Engineers Cite Strides in Processing

Highlights of the past year's progress in baking were revealed by speakers at the 30th annual meeting of the American Society of Bakery Engineers recently held in Chicago.

Handling quantities of frozen bread was covered by Dean Paul Arnold, of Arnold Baking Co., Port Chester, N. Y. He cited advantages through freezing that leveled off production. This permits a five-day week with even load distribution, with savings effected through minimizing overtime.

Frozen bread is now distributed all along the East coast, with trailer loads handled at a 27% saving as compared with fresh-bread distribution. Shipping in the frozen state eliminates adverse effects of delays and weather and allows better matching of area demand, cuting down on quantities of staled loaves.

Silicon coating of pans was reviewed by H. W. Gillespie, Ekco Products, Inc., Chicago. Coatings, he said, remove off-flavors imposed by old grease, increase heat transfer and speed baking time (since old carbon insulates), abolish "hour glassing" of bread due to poor baking at sidewalls, eliminate frying due to grease in pans, and feature optimum release of baked goods. The speaker said coatings should be renewed after 200 bakings or release cycles.

Taste depreciation of bread, soft rolls, coffee cake, and doughnuts—frozen vs. fresh, over a four-day "shelf life" period—was considered by Duncan Anderson, F. N. Calderwood, Inc., Portland, Me.

He related how a seven-woman consumer panel tested both fresh and frozen items from similar formulas and production runs, with all items packaged to simulate typical sales conditions.

Results on four types of bread—firm, commercial, dark loaf, and sandwich loaf—indicated that the baker need have no apprehensions about going to freezing. While for the firm type, there was preference for the fresh, both as regards freshness and flavor, on the commercial loaf, more favored the frozen for flavor and freshness. Little difference in preference was noted on the dark loaf. And as for the sandwich type, the frozen was strongly preferred for flavor and particularly for freshness.

Continuous bread making was the topic of John C. Baker, director of research, Wallace & Tiernan, Belleville, N. J. Inventor of the new process bearing his name (see feature on p. 88), he detailed the various phases of the system, along with production figures and quality notes on finished product. Output at bakeries currently trying the method has exceeded 68 loaves per minute. Texture and softness of loaves are reported excellent.

"Hot" Food Irradiator

Liquid radioactive fission products are mixed with cement to form latest type hollow, cylindrical concrete-block radiation source. One of units, as powerful as several pounds of radium, will be used at MIT to irradiate microorganisms in food. Here, the apparatus, developed by Argonne National Laboratory, Lemont, Ill., is opened to view with safe dummy cylinder. Additional ordinary concrete surrounds the source, and there are thick shielding walls of lead, also a lead cover (not shown). Materials to be treated are placed within central well. Operator holds tube that is employed (by remote means) to form this cavity when mixing a "live" block.

USDA Grade Standards

Recent actions by USDA's Agricultural Marketing Service on U. S. Grade Standards and related activities include following:

Green corn, revised, proposed, p. 11, Jan. 1 *Federal Register*.

Green asparagus, revised, proposed, p. 354, Jan. 20 *Federal Register*.

Frozen strawberries, revised, proposed, p. 480, Jan. 28 *Federal Register*.

Shelled English walnuts, p. 817, Feb. 12 *Federal Register*, effective Mar. 14.

Watermelons, revised, p. 1263, Mar. 6 *Federal Register*, effective Mar. 20.

Topped carrots, revised, proposed, p. 1288, Mar. 6 *Federal Register*.

Butter, revised, p. 1323, Mar. 9 *Federal Register*, effective Apr. 1.

Keeping Up With The Field Continues on Page 213➡

Plastics Packager

with Premium and Display News

PLASTICS DIVISION • MONSANTO CHEMICAL CO. • SPRINGFIELD, MASS.

Polyethylene

The New Look in Packaging

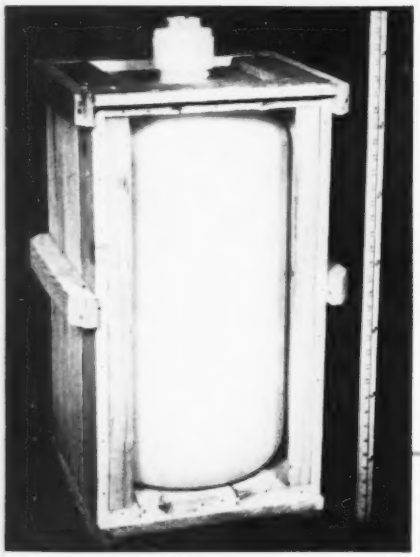
Lightweight, flexible and transparent, polyethylene film for food and produce packaging keeps contents fresh longer, adds a bit of glamour to the vegetable counter.

Within the next several years, the term polyethylene bids fair to become one of the biggest names, literally and figuratively, in the packaging industry. This versatile plastic which started out as a "war baby" ten years ago when first developed for Navy radar insulation, has since grown into a lusty giant that has already broken many of the industry's minor records and is now reaching for the big ones.

As a packaging material, polyethylene boasts an enviable degree of versatility. It's tough enough to have inspired such uses as practice golf balls and gunnery targets; it's abrasion-resistant, water proof, and so lightweight it actually floats on water. It is impervious to most acids, alkalies and corrosive agents which would normally make short shrift of other packaging mediums. It is relatively inert chemically and has outstanding electrical properties. Odorless, tasteless, completely non-toxic, it can be molded, extruded or readily combined with other materials to fill specific packaging requirements. This is the profile of polyethylene; why it has manufacturers agog with its possibilities and benefits.

Polyethylene is perhaps best known to mostpeople as the famous "squeeze bottle" plastic that caused such a sensation when first introduced by the Plax Corporation in 1948 and has since worked a dramatic change in the way a long list of health and beauty aids, from baby lotions to after-shave powders and preparations, are marketed. In five short years, more than 2,000 different products have gone to market in the unbreakable, handy containers. And with good reason. Manufacturers have found that flexible squeeze bottles have jumped sales tremendously. Intricate molded shapes, good color selection, and the "squeeze to use" idea have captured the imagination of the consumer and assured retailers a loyal audience of repeat customers. At the manufacturing and retail levels molded polyethylene bottles have sent breakage, shipping and handling costs tumbling.

These same material advantages have boomed the use of polyethylene carboys, rugged offspring of the dainty squeeze bottle. Crush-proof, impact-and shock-resistant, resilient polyethylene carboys are becoming an increasingly important factor in the shipment and storage of bulk liquids, particularly chemicals and



Tough, impact-and acid-resistant carboys and drums are now being molded of polyethylene in sizes up to 55-gallon capacity. Shown is a 13-gallon carboy.

corrosive acids. Under tests, such carboys have withstood the weight of 10 tons without rupturing.

In the food field as well, there seems to be no end to the diversity of uses for the flexible, unbreakable bottles. They are being used to dispense almost every type of liquid food from maple and chocolate syrup to ketchup and honey.

Taking up where the bottles leave off, tough, flexible, transparent polyethylene film is being used to package all manner of fresh and frozen food stuffs. Less than two thousandths of an inch thick, the film is particularly effective as a package for fresh vegetables and perishable foods because it provides a seal against moisture and odors and keeps freshness sealed in. Polyethylene-packaged produce looks better, has more consumer appeal, which means faster turnover and more economy in handling for the grower as well as the retailer.

Fabricated polyethylene bags offer textile product manufacturers and their customers five big advantages: protection, durability, semi-transparency, long shelf life and reuse value. At retail level, the flexible packages which can be attractively printed and decorated, keep unit or coordinated merchandise free from counter soilage, conserve counter and stock room space.

Manufacturers of small hardware items like nuts and bolts, washers, etc., have found polyethylene a big step forward in marketing and merchandising measured quantities and assortments

In film form, polyethylene has also been used to line industrial drums and boxes for shipping food products and metal goods, insuring protection against moisture, chemicals, grease and corrosion.

In other packaging areas, polyethylene is mixed with wax in the preparation of hot melt coatings for paper wrappers for bread and frozen food stuffs. The poly-wax mixture helps seal in freshness, gives the basic packaging medium greater gloss and printability, tear resistance and improved low temperature flexibility.

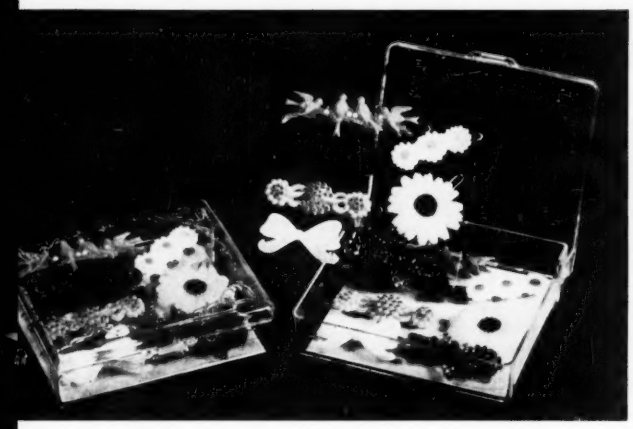
Polyethylene's compatibility with other packaging materials is evidenced by its growing use in multiwall bags (fabricated of Kraft paper and polyethylene "sandwiches") for packaging products as diverse as dried milk, peeled potatoes, fertilizers, peet moss, and calcium chloride.

Polyethylene film laminated to foil or cellophane makes an ideal low-cost packaging material for such products as frozen fruit juice concentrates and hygroscopic powders by offering greater flexibility at lower temperatures, increased strength and moisture resistance and longer shelf life. In all cases, polyethylene coatings and extrusion laminates offer industry a new measure of packaging economy and versatility.

In yet another field barely scratched, molded polyethylene packages and containers have since their inception led the housewife's hit parade in their role as handy refrigerator storage and food containers. Certain designs have caps and closures with molded-in gaskets or liners which, because of the plastic's unique flexibility, conform to variations in the container's shape to produce a tight seal. The soft toughness of polyethylene makes it an ideal lightweight container for delicate machined or threaded parts and gages, and many new box designs of one piece construction with novel built-in hinged covers have made their appearance in recent months.

To help supply manufacturers with enough polyethylene for their packaging needs, Monsanto's new Texas City facilities will begin production early in 1955. In the meantime, as new developments in polyethylene packaging unfold, important details and descriptive information will be published in the PLASTICS PACKAGER. For information on specific applications, write to Monsanto Chemical Company, Plastics Division, Springfield, Mass.

Whether used in molded or film form, or as a wax coating, few if any packaging materials can match polyethylene's amazing versatility in the consumer product field.



Colorful Clasps Packaged in Crystal Lustrex

Grouping items that "go" together so they'll sell together in bigger volume is smart merchandising no matter how you spell it. This clever packaging idea to dress up the appeal of a week's supply of young ladies' barrettes, small clasps to keep the hair in place, is being used by Tip Top Products Company, Omaha, Nebr., who mold their own packages of Lustrex styrene.

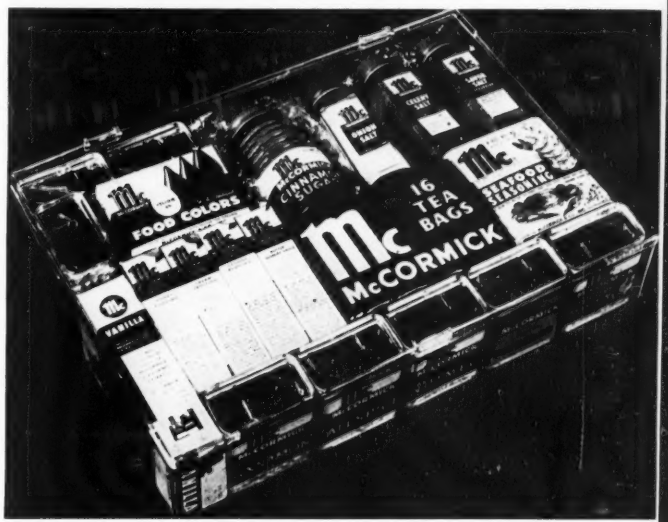
Each transparent package holds seven pairs of barrettes which are also molded of Lustrex in various colors and designs and further decorated by hand-painting. The colorful clips are then fastened to pre-cut squares of transparent cellulose acetate plastic film, creating an appearance of suspended display. A printed paper label insert, visible through the bottom of the case, carries selling information on the contents, the price and the manufacturer. It also conveys the suggestion that the package be reused as a jewelry box for keeping the barrettes tidily stored.

Long a favorite with junior misses, since being packaged in the Lustrex case the Tip Top sets have become more appealing to the teen-age market and a greater demand has resulted from small drug and stationery stores as well as from the larger chains.

Sugar 'n Spice Done Up Nice In Crystal Lustrex

For a good will gift to friends, suppliers, customers — or for the family larder — what would fill the food cabinet better than this spicy offering? McCormick and Company, Inc., Baltimore, world's largest spice and extract house, uses an assortment of 20 of its nationally-known products encased in a transparent rigid box molded of Lustrex styrene plastic. Measuring $9\frac{1}{2}$ x $13\frac{1}{4}$ x $2\frac{1}{4}$ inches, the box has a hinged lid which makes it perfect for pantry shelf storage and multiplies its reuse possibilities.

The full-view visibility of products packaged in clear styrene containers is a packaging plus for super markets and self-service stores. The box shown is one of dozens of stock plastic packages currently available from Tri-State Plastic Molding Co., Henderson, Ky. Write for free catalog and other information.



Easel Display Stands Erect

A handsome display holder molded of crystal Lustrex sytrene makes an appropriate setting for this Benrus watch bracelet. The product name and slogan copy is molded into the holder in raised colored lettering at the top and bottom. Molded-in slots at each end are designed to fit the velvet pad to which the bracelet is attached. A small metal easel device which is clamped to the reverse side of the holder permits it to be displayed upright in jewelry store windows and counters. Molded by the Massachusetts Plastics Corp., Ludlow, Mass., the holder design was prompted by the desirability of gaining top-of-the-counter display space in a minimum of display area.

What Are Your Stock Package Requirements?

If you are a supplier of merchandise that is displayed or sold over the counter or on the aisle, chances are there is a stock package now being molded by a plastics company in your locality that would just meet your requirements. Why not check on this economical, quick and efficient method of solving your package design and fabrication headaches? The "specs" below refer to just a few of the hundreds of stock package designs currently listed in Monsanto's Stock Package Information File. For further details on these and other packages available, write to Monsanto Chemical Company, Plastics Division, Springfield, Mass.

RECTANGULAR

No.	*Length*	*Width*	*Depth*	*Cover*	*Colors*	*Molder*
1-27	3"	1 7/8"	1 1/4"	FF	Any Std.	Dillon Beck Mfg. Co.
1-21	3 5/8"	1 7/8"	1 1/4"	Telescope	Cora Bola Satin Wood	Plasticraft Mfg. Co.
1-23	4"	2 1/4"	1 1/8"	Telescope	Cora Bola Satin Wood	Plasticraft Mfg. Co.
1-14	4 1/8"	2 13/16"	2 3/4"	LF	Assorted	Artcraft Paper Box Co.
1-13	4 11/16"	2 3/8"	1 5/16"	FF	Assorted	Artcraft Paper Box Co.
1-34	4 3/4"	4 1/4"	3"	FX		Alladin Plastics, Inc.
1-5	5 5/16"	3 5/16"	1 5/16"	Hinged	Clear	Continental Plastics Corp.
1-8	5 7/8"	2 7/8"	1 1/2"	Slide	Clear	American Molding Co.
1-10	6 1/2"	4 1/2"	1"	FF	Assorted	Moonglow Novelty Corp.
1-2	6 3/4"	3 7/16"	13/16"	Hinged	To spec.	Victory Mfg. Co.
B-11	9 9/16"	3 9/16"	2 1/4"	FF	Clear	Bradley Industries
300C	7 3/4"	3 5/8"	1 1/4"	Hinged	Clear	Bradley Industries

OCTAGONAL

4-14		1 1/2"	1/2"	HC/SC	Crystal var. of opaque or transp.	M & L Plastic Corp.

SQUARE-FLAT

2-1	5 3/4"	3 1/2"	13/16"	Slide-on	To spec.	Victory Mfg. Co.
2-3	4 9/16"	4 9/16"	1"	Slide	Clear	American Mold Co.
2-4	3 3/16"	2 7/8"	1 7/16"	FF	Asst.	Artcraft Paper Box
2-9	3 5/16"	2 3/4"	3/8"	HC/SC	Crystal opaque or transp.	M & L Plastic Corp.
2-10	3 5/16"	2 3/4"	3/4"	HC/SC	Crystal opaque or transp.	M & L Plastic Corp.
2-21	4 1/2"	4 1/2"	2"	FF	Clear	Rogers Plastic Corp.

CYLINDRICAL

	Diam.	*Depth*			
3-9	1.016 ID	2 27/64"	FF/FX	Clear	Owens-Illinois Glass Co.
3-19	1" ID	3 7/16"	FF/FX	Crystal & Green	Metaltex, Inc.
3-21	1 7/8"	1 3/4"	TC	Assorted	Celluplastic Corp.
3-1	3 1/2"	7/8"	FF	Clear	Federal Tool Corp.
3-53	3 5/8" top 3" bottom	3 3/4"	FF	Clear	Precision Plastics Co.
3-35	3 5/8" maj. 3 1/2" min.	1 7/16"	FF	Any Std.	Dillon Beck Mfg. Co.
3-54	3 5/8" top 3" bottom	3 3/4"	FF	Assorted	Precision Plastics Co.
3-2	4 7/8"	7/8"	FF	Clear	Federal Tool Corp.
3-57	Bottles		TC/FX		Elmer E. Mills Corp.
3-41	1/2"	2"	FX FF TC	Transp. or opaque-clear	Lermer Plastics, Inc.
3-28	1 3/8"	1/2"	SC/FX	Natural	Buckeye Molding Co.
3-23	2 9/16"	2 3/4"	SC/FX	Natural	Buckeye Molding Co.
3-48	1"	3"	FX FF TC	Transp. or opaque	Lermer Plastics, Inc.
3-4	4 1/4"	2 1/2"	FF/FX	Rose, Yellow-Assorted	Como Plastics, Inc.
3-75	3"	1 1/4"	FF	Clear	Popular Plastics Co.

Lustrex, Vuepak, Ultron, Reg. U. S. Pat. Off.

MONSANTO CHEMICAL COMPANY, Plastics Division, Room 7801
Springfield 2, Mass.
Please send me your Stock Package Catalog.

Name and Title

Company

Address

City, Zone, State

World Food Shorts

Mexico: Coffee exports are expected to reach 1,000,000 bags this year, as compared with 800,000 in '53. The country's plantations, substantially controlled by German planters, are in the southern-Mexico state of Chiapus . . . Some 20,000 tons of frozen fresh shrimp are slated to be flown to U. S. markets during the present '54 fishing season. To aid in handling this and other Gulf-coast seafood, the government is opening a new $1,100,000 freezing plant having 150,000-tons capacity at Vera Cruz, and similar plants are planned at five other ports.

Italy: Regulation of use of benzoate of soda in fruit syrups (not to exceed .5%) and fruit juices (not more than .1%) is called for in a Senate bill submitted by the Ministry of Industry . . . Tomato paste for export now must be presented to the National Institute of Food Preserves for inspection of quality. Product found fit will be certificated.

Russia: Signing of contracts with British firms for industrial equipment, including various food plant machinery is announced. Additional food-unit orders are yet to be finalized.

Turkey: With three new sugar plants, started, another to be inaugurated in October, and still another in the planning stage, Turkey's total annual sugar-producing capacity is seen surpassing 400,000 tons. Accordingly, the country is expected to become an exporter of sugar.

Iraq: Industrialization is bringing machine methods to bear on age-old processes in this country. Thus, date stones now are being pitted by mechanical equipment. Further, there is increasing output of a date-syrup product.

Denmark: Ale having a "fuller flavor" is declared achieved with use of a new barley variety. Carlsberg II.—*McGraw-Hill World News*

Swift Ups Research

Space is being made available for a 25% expansion in research by Swift & Co. Chicago.

And an important aspect of the company's expanding research is an equipment development division, with a complete experimental shop.

At Swift, however, research is considered everybody's job. No single segment of the organization is given the exclusive assignment for new ideas. And the company notes that since 1925, when its suggestion plan was started, 42,444 usable ideas have been turned in. Awards for these have totaled $740,518.

Cyclone Equalized Conveyor Belt
Speeds Up
Tomato Picking and Packing
• Now Cyclone Conveyor Belts go right into the field where the tomatoes are grown. A new Row Crop Harvester, equipped with a Cyclone Equalized Conveyor Belt, is tractor-pulled down the field. Workers place tomatoes on the moving belt, which elevates them to truck for sorting, packing and stacking. Result: A saving in both time and amount of actual field labor.
You may not need as new or revolutionary a change as this in your food processing operation. But if you have a plant bottleneck of any kind, the chances are a Cyclone Conveyor Belt could eliminate it. Ask our experienced engineers for advice, and write Dept. H-44 for a free Catalog No. 5.
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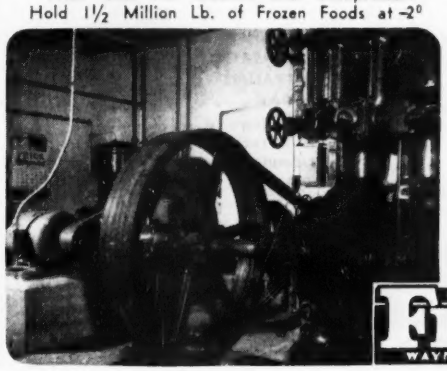
UNITED STATES STEEL

Frick Unit Air Coolers and Compressors Hold 1½ Million Lb. of Frozen Foods at –2°



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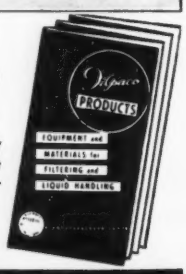

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THE FILTER PAPER COMPANY
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Briefly . . .

● CAN and allied research will be stepped up in American Can Co.'s new scientific lab now under construction on 40-acre tract at Barrington, Ill. Tin plate coatings, food chemistry, and nutrition will be studied in forthcoming facility. And goal of elimination of tin in can-making will be further ranged.

● FROZEN FOOD pioneers are newly acclaimed by formation of the Honorable Order of Zerocrats. No. 1 charter member is Clarence Birdseye, hailed as "the father of frozen foods." Only some 20 others are counted eligible for the exclusive group named by members of the National Wholesale Frozen Food Distributors Assn.

● TECHNOLOGY in four fields—sanitation, nutrition, flavor acceptance, and radiation sterilization—will be spotlighted in this year's Special Summer Program in Food Technology at Massachusetts Institute of Technology, Cambridge. Dates: July 12-30.

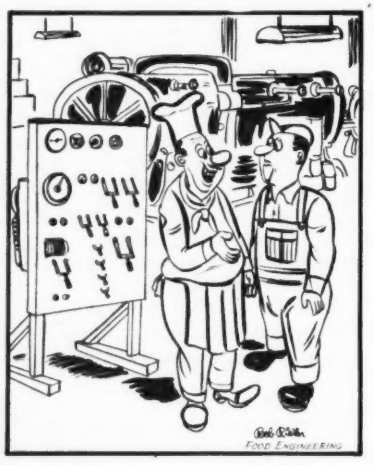
● CANNED-TOMATO promotion is on the upsurge, with membership in the Tomato Council rising to 72 canners in 11 states only eight months after launching of the group. Council president is William R. Edmonds, sales manager of D. E. Foote Co., Inc.

Chill-Wash of Butter

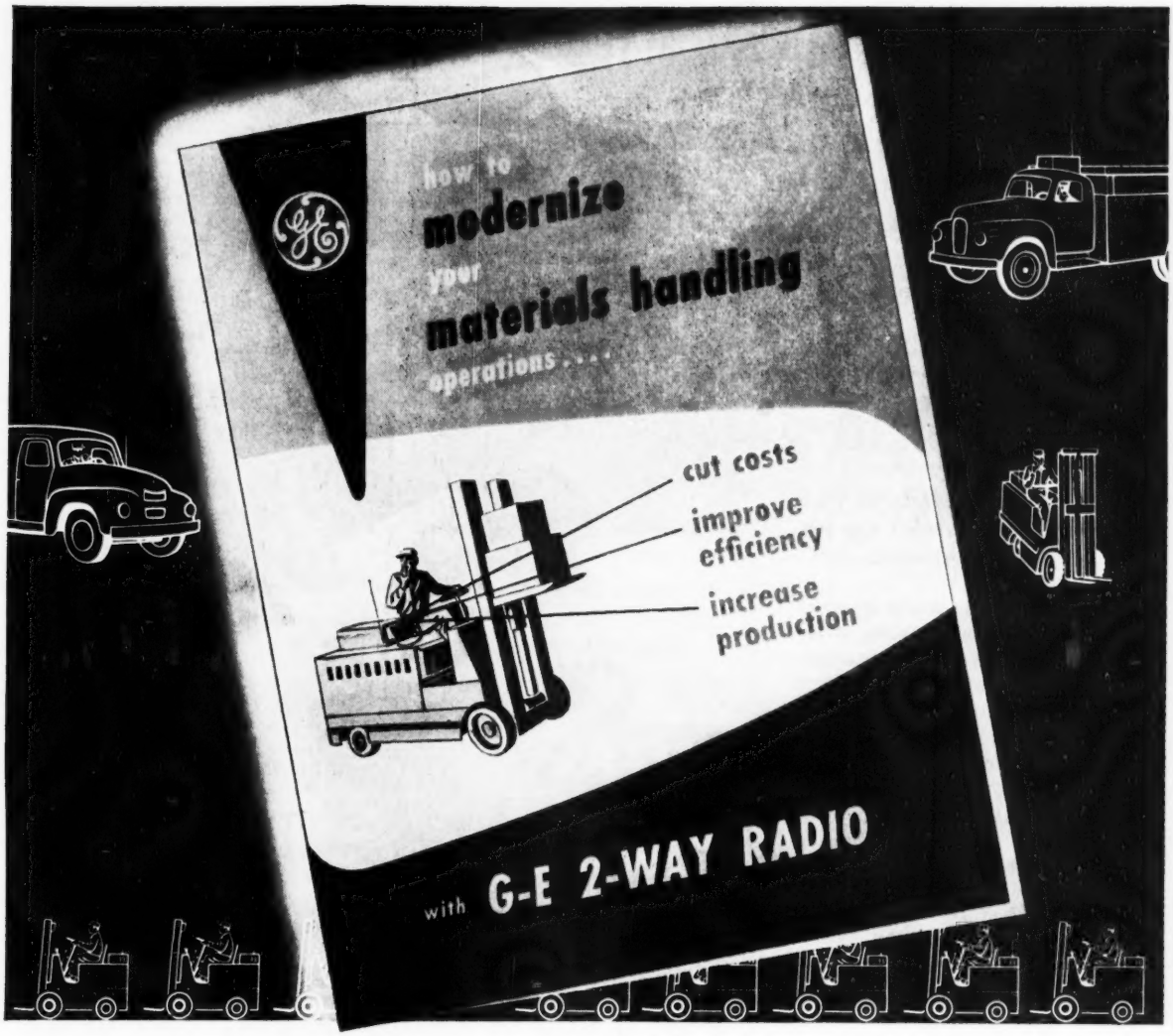
Quality and shelf-life of non-washed butter very closely paralleled those of washed butter in extensive studies just completed.

A group of scientists at the New Zealand Dairy Research Institute, North Palmerston, N. Z. carried out the work.

Non-washed butter was compared with washed butter from similar cream in about a half dozen large factories and under special pilot plant conditions. Examined soon after manufac-



"I'm creating a new soup. I just flicked all the switches at once!"



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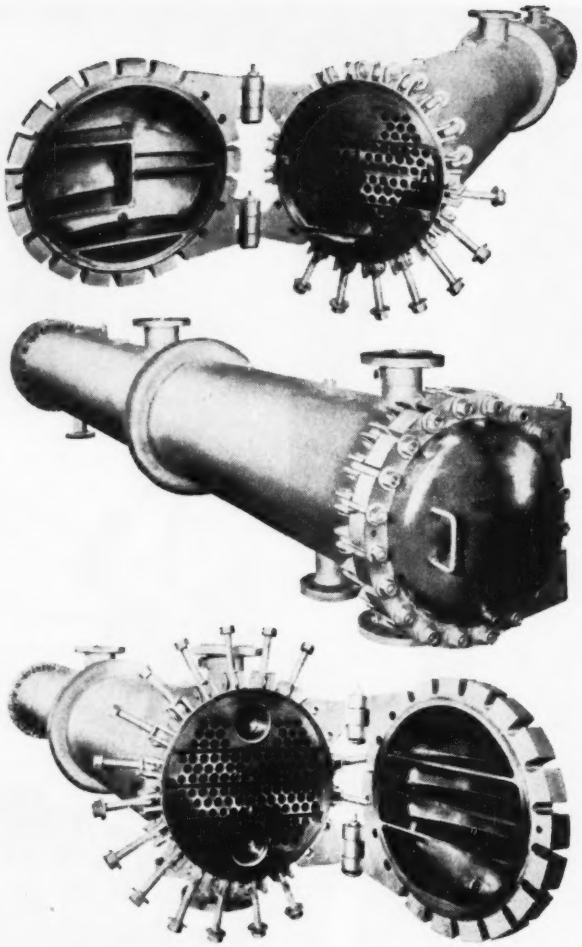
a juicy problem

Pasteurizing fruit and vegetable juice in continuous flow is another way **p-k** special purpose heat exchange equipment is being used.

All parts of this unit which are in contact with the juices being processed are of stainless steel construction. It opens at both ends for easy, clinical cleaning. Uses six tube-side juice passes for efficient heat transfer. Materials, design details and finish conform to ASME and the most rigid sanitary standards. Here is another typical example of **p-k** thermal engineering and mechanical design.



Will standard equipment meet your needs?

p-k has designed and built dependable special purpose heat exchangers for years. This engineering and fabricating experience works to your advantage when you ask **p-k** for ideas on heat exchange problems. Your process may require special equipment, but, on the other hand, standard **p-k** heat exchangers may be your answer. If you can use standard units, available in many sizes and types of shell and tube arrangements, you can save on delivery time and engineering costs.

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1910

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Schedule of Events

April

25–29—National Refrigerated Warehouse Assn.; Boca Raton, Fla.
26–28—Pacific Northwest Bakers Conference; Multnomah Hotel, Portland, Ore.
29–30—Pennsylvania Manufacturing Confectioners' Assn., annual production conference; Little Theatre, Franklin & Marshall College, Lancaster, Pa.

May

2–5—National Fisheries Institute; Hotel Cleveland, Cleveland.
9—National Pretzel Bakers Institute, spring meeting; Wernersville, Pa.
16–19—U. S. Wholesale Grocers' Assn., convention-exhibit; St. Louis.
16–19—Flavoring Extract Manufacturers' Assn. of U. S., annual convention; Hotel Biltmore, New York City.
17–19—Grocery Manufacturers of America, mid-year meeting; Boca Raton Hotel, Boca Raton, Fla.
17–19—Millers National Federation; Edgewater Beach Hotel, Chicago.
23–27—American Assn. of Cereal Chemists, annual meeting; Cosmopolitan Hotel, Denver, Colo.
23–27—Assn. of Operative Millers, technical conference; Hotel Sherman, Chicago.
26–29—Canadian Wholesale Grocers' Assn.; Quebec.
30–J6—International Congress of Agricultural & Food Industries; Madrid, Spain.

June

9–11—Processed Apples Institute, spring meeting; Skytop, Pa.
12–15—New England Bakers Assn.; Poland Spring, Me.
17–18—Bakery Equipment Manufacturers Assn.; Cavalier Hotel, Virginia Beach, Va.
22–24—American Dairy Science Assn., annual meeting; Pennsylvania State University, State College, Pa.
27–J1—Institute of Food Technologists, annual meeting; Los Angeles.

ture, both kinds were found to be of equivalent grade even when made of cream of relatively poor quality. And they showed similar losses in grade score when held at 14 deg. F. for 4 and 8 months. The butters had similar amino-nitrogen/total-nitrogen values and butterfats extracted from the stored butters gave similar Lea peroxide tests, Schibsted fat aldehyde values, and fat acidity values. Bacterial counts were at no stage significantly different.

These tests, taken in conjunction with overseas research, indicate that with cream of reasonable quality omission of the chill-water wash is not likely to affect the quality of the butter provided that the churnability of the cream is such that the churning temperature can be low enough to permit an adequate control of butter consistency.

The increase noted in percentage curd content of the butter due to non-washing was within the range 0.31 to 0.64—*McGraw-Hill World News.*

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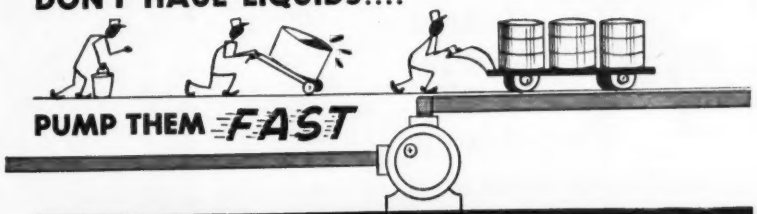

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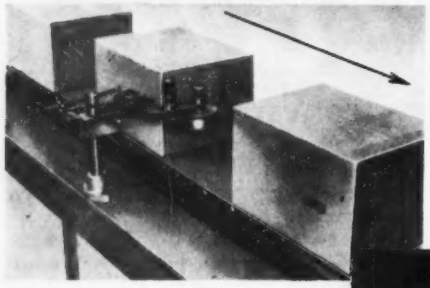
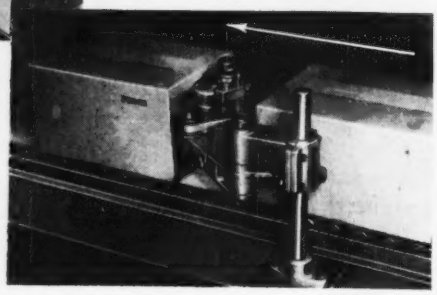


New ROLACODER units attach to conveyor or sealer . . . imprint code-dates, lot numbers on all 4 panels of cases simultaneously . . . *without requiring cases to be turned.*

ROLACODER 500

imprints *front* and one *side* panel simultaneously



ROLACODER 200

imprints *rear* and other *side* panel simultaneously

Write for new descriptive sheet ROL-1

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METSO

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Sets Fast Pace

—*Continued from page 62*

would have been significantly higher—calling for larger transformers—if a 200-hp. synchronous motor-driven compressor had been installed instead of the steam-turbine driven unit. This would have required the fabrication of a new, larger transformer vault, for which there was no easily available room.

More Efficient Power

Power is now supplied at 11,000 volts through three 1,500-kw. transformers, which step it down to 440 and 110 volts. Six months ago, the maximum power demand reached 1,650 kw. Currently, by operating the turbine-driven compressor, this has been reduced to a maximum of 1,430 kw.

Plant engineer may check temperatures, pressures, liquid levels, and flow throughout the plant on the centralized instrument panel located in the boiler room.

Advances in Refrigeration

The flooded ammonia system supplies refrigeration to these major units or departments: (1) Ammonia sections of hot wort cooler, (2) cold diffusers in the cellars, (3) beer coolers-heat exchangers, and (4) to maintain a temperature of 18 deg. in a brine system used in the temperators to cool beer in tanks.

Thirty diffusers maintain a temperature of 31-50 deg. F. in the cellars, four beer coolers, one hot wort cooler, and three brine coolers. Brine is refrigerated by the ammonia system to 18 deg. and used in temporators to cool beer in tanks and for the air conditioning system.

Automatic controls maintain this temperature during refrigeration demand variations.

Thermo-water controls on compressors maintain exiting compressor cooling water at a uniform 120 deg. This is pumped to the surplus water storage tank.

To minimize the hazard of mechanical damage to refrigeration compressors—which could result from the return, through suction lines, of saturated ammonia gas—an ammonia accumulator has been installed at an intermediate point between the beer coolers, diffusers, and compressors. Slop-over ammonia or saturated gas is vaporized in the heated accumulator.

After compression, the ammonia

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Thermo King truck refrigeration has stand out quality . . . because of experienced, thoughtful design and manufacture. The end product as a result is a fine piece of machinery made up of component parts, designed, engineered and assembled to "go" together.
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• There's a network of factory trained Thermo King service along the Nation's principal highways. Quick and efficient service for you, made easier by single package design. Complete unit can be serviced or replaced in minutes.
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For more information, use coupon on page 175.

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For engineers, designers, and all who use or can use silicones, this engineering-slanted manual provides a correlated source of the available information on properties, preparation, and applications of silicones—treated as non-technically as possible. It covers all the commercially available silicone products . . . lists industries and uses they make of silicones, plus cost considerations . . . outlines history of silicone development, its possible uses in medicine and pharmacy, and the elementary chemistry of preparation of silicones from raw material to finished product. **By Rob Roy McGregor, Administrative Fellow, Mellon Inst. 302 pp., 29 illus., 31 tables, $5.00**

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FOOD-4

gas, now at 180-250 deg. and 150 psi., first is reduced to 80 deg. in the evaporative condensers' desuperheaters, then to 50 deg. Now it returns as liquid to the ammonia receiver to complete the refrigeration cycle.

CO_2 Innovations

Carbon dioxide, generated by the fermenting wort, is compressed to the liquid state and stored at 250 psi. Three compressors with carbon piston rings (no oil needed) take the suction from closed fermenters and store it in this 30,000 lb. tank at −16 deg. The liquid CO_2 is evaporated and filtered when subsequently used to carbonate finished beer or as counterpressure to rapidly unload any of the beer storage tanks.

The liquid vaporizer, developed by Burgermeister, consists of a double-pipe U-tube about 6 ft. high, the necessary valves, and two activated-charcoal filters. Thermostatically controlled steam in the inner 1-in. tube provides heat for vaporization of the liquid CO_2 in the outer 2-in. tube. Both inlet and outlet pressures are 250 psi. The filters remove any undesirable flavors from the gas.

Formerly, three fin-type evaporators, with ¾-in. copper tubes, were used for vaporizing CO_2. These could not supply process demands and were frequently shut down for cleaning. Inlet pressure on these units was 250 psi., but the outlet pressure was reduced to 165 psi. In addition, these required various controls, solenoid valves, timing equipment for defrosting, and blowers.

The new vaporizer has only one steam control. And at the higher outlet pressures, it permits the delivery of CO_2 gas through smaller pipe lines. The new system delivers gas containing less than ½ of 1% of air.

Clean Compressed Air

There are numerous units, in addition to the automatic instruments, that use compressed air in a brewery. It is substituted for CO_2, when necessary, for counterpressure in the beer and wort tanks. And it operates the pneumatic systems in the bottle soakers, pasteurizers, automatic casers, and pallet loaders.

Storage tanks are located on the engine room roof as a safety and space-saving measure. Air is compressed to 100 psi., and the entire system requires approximately 1,000 cu. ft. a minute.

Suction by compressors is taken from the roof through filters to provide clean and safe air to the carbonring compressors.

End (Resume reading on page 63)

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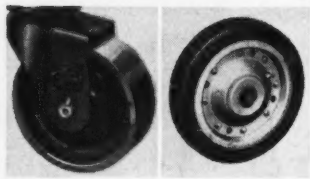
PERFORM MORE EFFICIENTLY AT LOWER COST AND LAST LONGER!



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Repair costs? Records show less than $3 per battery per year

Users of EDISON batteries to power their industrial trucks enjoy big economies in the cost of repairs. Here are some figures that indicate how small this cost usually is. These records show the amounts billed to various customers for cell repairs, paint, electrolyte, tools and replacement parts over periods ranging from five to ten years.

For one customer, operating 103 batteries, these amounts averaged $2.89 per battery per year over a period of five years. For another customer, operating 44 batteries, the average was $1.25 per battery per year over a period of ten years. Still another customer, operating 29 batteries, had an average of $1.70 per battery per year over a six-year period.

Steel cell construction and a foolproof principle of operation are the major reasons these costs are so low. For complete information, why not send for bulletins 3808 and 2039, and request a visit from the Edison field engineer nearest you. Write Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey.

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5. **Simplified lubrication**
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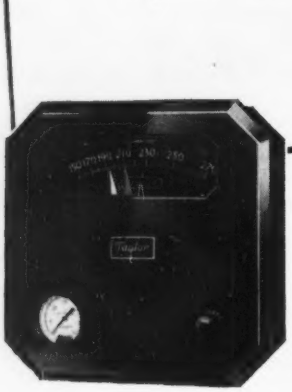
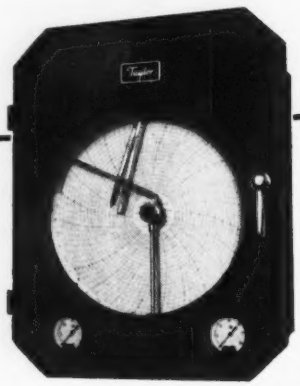
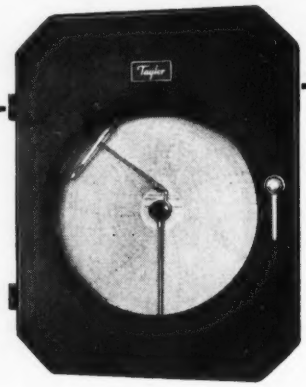
YOU KNOW what's going on every second when your processing operation is run by Taylor controls. The instruments shown on this page are just a few examples of how Taylor can save you money. Taylor can recommend the right instruments for every canning operation from a simple pressure gage on a steam line to completely automatic control systems for retorts or continuous cooker-coolers. Ask your Taylor Field Engineer! And write for **Catalog 500.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.



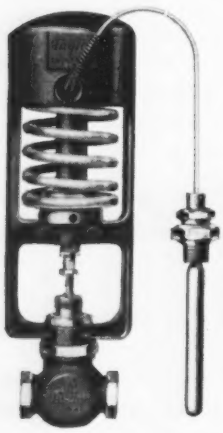
The Taylor FULSCOPE Indicating Temperature Controller is especially useful where chart record is not necessary or where Recording Thermometer is already in use. Controls temperatures within very close limits. Direct Set Adjustment makes it possible to change control point by turning knob outside case.



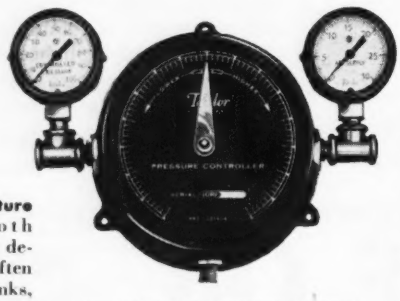
This versatile Taylor FULSCOPE* Recording Temperature Controller can be used in storage rooms, cooling canals, open tanks, retorts, sterilizers, blanchers and continuous cooker coolers. Instrument automatically regulates temperature and provides a written record of entire cooking process.



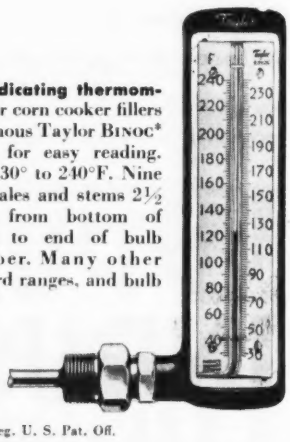
Where a written record is important, Taylor's Recording Thermometer is the answer. Especially valuable on exhausters, lye peelers, retorts and cookers. Gives accurate, minute-by-minute written record from which any irregularity can be quickly detected.



Self-acting Temperature Controller offer both quick response and dependability. Most often used on open tanks, peelers, sterilizer and hot water tanks. Double-seated, quick-opening valves are standard.



Non-Indicating Pressure Controller is inexpensive and rugged. Especially useful on cookers, coolers, steam lines, etc. Air operated, it may be used on direct or back pressure applications.



This indicating thermometer for corn cooker fillers has famous Taylor BINOC* tubing for easy reading. Range 30° to 240°F. Nine inch scales and stems 2½ inches from bottom of thread to end of bulb chamber. Many other standard ranges, and bulb forms.

*Reg. U. S. Pat. Off.

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Dry Skim Milk Powder Designed to Improve Oven-Spring Volume of Dough Produced by Chlorinating to Change Reducing Action of S-H Radicals of Sulphydrils—*F. F. Hansen, Pittsburgh, Pa.* No. 2,663,643. Dec. 22, 1953.

Dry Skim Milk Powder to Improve Oven-Spring in Dough Made by Irradiating With Ultra-Violet Light at 2500 to 3000 Angstrom Wavelengths—*F. F. Hansen, Pittsburgh, Pa.* No. 2,663,644. Dec. 22, 1953.

Table Salt With Improved Flowability and Non-Caking Qualities Incorporating Precipitated Silicate and Edible Water-Insoluble Soap —*F. G. Miller, Denville, N. J. to Diamond Crystal Salt Co., St. Clair, Mich.* No. 2,664,357. Dec. 29, 1953.

Canned Dressed Fowl First Sealed in Perforated Envelope of Shrinkable Materials To Retain In-Can Body Shape During Processing and Storage—*E. H. Eichler, Dundee, Ill.* No. 2,664,358. Dec. 29, 1953.

PROCESSES

Supplying Carbonated Beverage to Filler Bowl Containing Gas Under Predetermined Counter Pressure—*F. T. Gricar, Jr., W. J. Sommers, and G. L. N. Meyer, Milwaukee to Geo. J. Meyer Mfg. Co., Cudahy, Wis.* No. 2,660,360 Nov. 24. 1953.

Treating Pop Corn by Exposing to Hot Solution of Non-Toxic Oil Solvent and Non-Toxic Dye, Washing, Draining, Drying—*R. Park, Cohasset, Minn.* No. 2,663,645. Dec. 22, 1953.

Treating Rice Bran Oil to Remove Gums and Waxes by Hydrating in Hot Water, Agitating, Cooling, Centrifuging, Emulsifying Sludge and Separating Wax From Gum—*G. J. Strezynski. to De Laval Separator Co., Poughkeepsie, N. Y.* No. 2,663,717. Dec. 22, 1953.

Refining Oil by Proportioning Caustic Soda to Stoichiometrically Equivalent of Free Fatty Acid Present, Then Separating Soap Stock After Less Than 5 Sec. Contact Time—*A. U. Ayres, Chestnut Hill, Pa. to The Sharples Corp., Philadelphia.* No. 2,663,719. Dec. 22, 1953.

Refining Raw Cocoa by Subjecting to Pressure In Presence of Water, Alcohol and Acetic Acid—*O. F. Kaden, Hamburg-Gross Flottbeck, Germany.* No. 2,665,210. Jan. 5, 1954.

Suppressing Decay in Fresh Fruits and Vegetables by Exposing to Vapors From Group Consisting of aB-dibromopropionaldehyde and aB-dichloropropionaldehyde — *L. J. Meuli, Long Beach, Calif. to Dow Chemical Co., Midland, Mich.* No. 2,665,217. Jan. 5, 1954.

Milk Protein Food Made by Heating Milk at pH to Avoid Precipitation of Casein and Lactalbumin, Then Precipitating These Components with Acid, Separating—*H. E. Howard, Hastings-on-Hudson, and R. J. Block, Scarsdale, N. Y., and H. E. Sevall, Elgin, Ill. to Borden Co., New York.* No. 2,665,989. Jan. 12, 1954.

Preparing Cheese With *Roquefortí* That Has Been Irradiated to Produce Mutant Which Keeps Cheese Free From Colored Venation—*S. G. Knight, Madison, Wis. to Wisconsin Alumni Foundation, Madison.* No. 2,665,990. Jan. 12, 1954.

Coffee Beans Treated to Prevent Deterioration by Enclosing in Impervious Film of Cellulose Material and Citric and Tartaric Acid —*M. Naps, Oakland, Calif.* No. 2,665,992. Jan. 12, 1954.

Refining Fatty Oils by Mixing With Polybasic Aliphatic Acid From Selected Group in Precise Proportions, Thereafter Alkaline Refining—*F. E. Sadler, West Chester, Pa. to Sharples Corp., Philadelphia.* No. 2,666,074. Jan. 12, 1954.

Continuously Recovering Esters and Other Volatiles by Mixing Fluid With Noncondensable Gas, Separating Volatile-Containing Gas by Vacuum, Isolating as Solid Crystals, Converting to Liquid—*E. R. Beu, Albion, N. Y.* No. 2,666,707. Jan. 19, 1954.

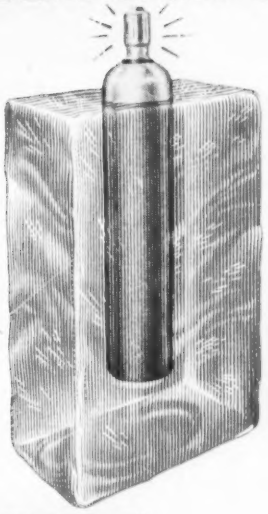
EQUIPMENT

Fruit Processing Machine Consisting of Rotating and Reciprocating Members Integrated by Cams and Cam Followers—*G. A. Dunn, Oakland, Calif. to California Packing Corp., San Francisco.* No. 2, 657,725. Nov. 3, 1953.

Distributor Head for Grain Tubes With Telescoping Extending and Retracting Movements—*R. A. Gerber to J. J. Gerber Sheet Metal Works, Inc., Minneapolis, Minn.* No. 2,657,782. Nov. 3, 1953.

Poultry Shackle Comprising T-shaped Body With Oppositely Di-

Freeze Out HIGH REFRIGERATION COSTS!



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2. Outstanding Delivery Service!—high speed delivery! Cylinder stocks maintained at all our coast-to-coast distribution stations. There is one near you ready to fill your needs *promptly* and *regularly*. 150, 100 and 50-lb. cylinders.

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4. Extremely Low Moisture!—doesn't freeze up expansion valves, corrode equipment or ice up in evaporators.

Operating costs are lower because you get more refrigeration per pound of Barrett Brand Anhydrous Ammonia than from a pound of any other type of refrigerant commonly used in food lockers, ice plants, cold storage and industrial cooling processes—all at a lower cost per pound for Ammonia. Order a trial shipment of 150, 100 or 50-lb. cylinders today!

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Piston is shown entering the ring . . . partly closed

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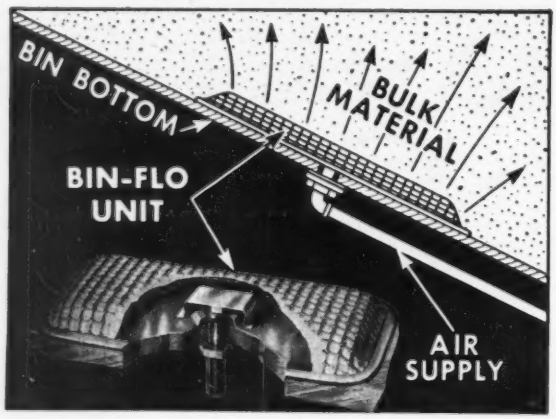

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rected Units Having Cooperating Jaws—*P. J. Altenpohl, Philadelphia, Pa.* No. 2,658,236. Nov. 10, 1953.

Apparatus for Applying Edible Coating to Food Product Such as Raw Oysters Employing Moving Belt, Edible Batter Spray, Particle Depositor—*G. T. Harrison to Tilghman Packing Co., Tilghman, Md.* No. 2,659,339. Nov. 17, '53.

Hydraulically Operated Baking Pan Turning Mechanism—*I. M. Archer to Campbell Taggart Research Corp., Dallas, Tex.* No. 2,659,475. Nov. 17, 1953.

Shrimp Peeling Machine With Converging Parallel Endless Conveyors—*H. Jagger, Maywood, Ill.* No. 2,659,930. Nov. 24, 1953.

Dough Slicing Mechanism Consisting of a Reciprocating Cross Head Slicer for Location Over Carrier Belt—*J. F. Anetsberger, Northbrook, Ill. and F. A. Anetsberger, Chicago to Anetsberger Brothers Inc., Northbrook.* No. 2,660,133. Nov. 17, 1953.

Centrifugal for Recovery of Liquids From Raw Vegetables Having Basket With Grating in Bottom and Scraper-Equipped Perforated Wall—*N. W. Berglind, Stureby, Sweden.* No. 2,660,211. Nov. 24, 1953.

Crayfish Picker Employing Parallel Adjustable Tensioned Crotched Rollers and Water Spray—*F. O. Roshko, New Orleans, La.* No. 2,660,754. Dec. 1, 1953.

Poultry-Gizzard Liner Remover With Spaced Rotary Pinchers—*M. I. Darrow, Chicago, G. R. Biddinger, Bellwood, and W. J. Patterson, La Grange, Ill. to Swift & Co., Chicago.* No. 2,660,756. Dec. 1, 1953.

Oven for Baking Wafer Batter in Continuous Sheets in Form of Endless Band Encircling Heated Drums—*T. R. and W. Neutelings, Bergen op Zoom, Netherlands to Industrie- en Handelmaatschappij "De Vuurslag" C. V. Roosendaal, Netherlands.* No. 2,660,961. Dec. 1, 1953.

Continuous Candy-Sucker Maker With Molding Rolls Having Stick Entering Grooves—*C. J. Covert, Glen Rock, N. J. and W. H. Genich, Racine, Wis. to Racine Confectioners' Machinery Co.* No. 2,660,963. Dec. 1, 1953.

Bread Panner With Superimposed Conveyors, Overhead One Depositing Dough Rolls Through Gate Into Spaced Pans Traveling Below—*H. C. Rhodes, Portland, Ore. to Read Standard Corp.* No. 2,661,680. Dec. 8, 1953.

Egg Cleaner and Sealer With Rotatable Means and Multiple Wiping Pads—*H. C. McLean to N. I. Troxel, Los Angeles, Calif.* No. 2,661,715. Dec. 8, 1953.

Air-Tight Centrifugal Separator for Cold Milk Products and Like—*H. M. Spross, Poughkeepsie, N. Y., to The De Laval Separator Co., New York.* No. 2,662,687. Dec. 15, 1953.

PACKAGING

Carton Erector and Can Loader—*C. R. Swafford (deceased) by V. E. Swafford to Container Corp. of America, Chicago.* No. 2,662,356. Dec. 15, 1953.

Container-Aligning Conveyor Employing Rotating Baffled Disk for Transposing Objects—*J. Black and O. Hedstrom to Armour and Co., Chicago.* No. 2,662,632. Dec. 15, 1953.

Heat Welder for Plurality of Thermoplastic Films Employing Woven-Wire-Screen-Working-Face Supplied by Special Lubricant—*E. V. Dettmer, Bay City, Mich. to Dow Chemical Co., Midland, Mich.* No. 2,663,350. Dec. 22, 1953.

Jar Unscrambler and Inverter—*C. E. Dascomb to Welch Grape Juice Co., Inc., Westfield, N. Y.* No. 2,663,401. Dec. 22, 1953.

Can Bag Unloader Consisting of Tiltable Receiver That Permits Tiers of Cans to Run Out Through Discharge Gate by Gravity—*S. R. Johnson, River Forest, and E. G. Blaing-Leisk, Chicago to Continental Can Co., New York.* No. 2,664,218. Dec. 29, 1953.

Racon Package Comprising Several Tearable Separator Leaves Anchored Along One Side With Laterally Opening Pockets to Receive Slices—*F. W. Swanson, Park Ridge, Ill.* No. 2,665,993. Jan. 12, 1954.

Soft Plastic Food Package Consisting of Reversible Cup of Flexible Thermoplastic Film—*L. Peters, Evanston, Ill.* No. 2,666,710. Jan. 19, 1954.

Sliced Food Bundling Apparatus Employing Fluid Blasting Means to Separate Portions—*B. E. Meulemans, and W. A. Nelson, Green Bay, Wis. to Swift & Co., Chicago.* No. 2,667,420. Jan. 26, 1954.

Impervious Food Container for Hermetically Sealed Dried Fruit Containing Propylene Oxide at Subatmospheric Pressure—*W. J. Parks, Richmond, Calif. to Owens-Illinois Glass Co., Ohio.* No. 2,667,421. Jan. 26, 1954.

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers for those you want and enclosing 25¢ for each copy.

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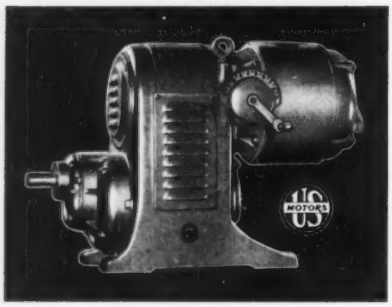

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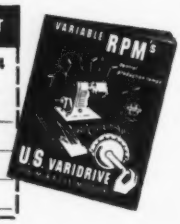

Men & Companies

Everett Ackley, formerly coordinator of operating quality for Quaker Maid Co., New York City, has been appointed director of research and development and assistant director of quality control of Hines-Park Foods, Inc.

Industry

Anheuser-Busch, Inc.'s new $20 million plant at Van Nuys, Calif. has begun operation and will produce 920,000 bbl. annually when in full production.

Arizona Citrus Growers Assn. has a new $350,000 citrus packing plant under construction at Phoenix, Ariz.

Berghoff Brewing Corporation's Fort Wayne, Ind. brewery has been leased to Falstaff Brewing Corp. of St. Louis.

Brecht Candy Co., Denver, was sold recently to Denver and Chicago manufacturers for a price reported to exceed $200,000.

Brentwood Egg Co. is constructing $100,000 plant for candling, packing and storage in Burnaby, B. C.

California Packing Corp., San Francisco, has elected A. H. Brawner and O. E. Seegelken as new directors.

Canada Dry Ginger Ale, Inc., has broken ground at Maspeth, L. I. for a new structure which will be the company's largest so far.

Canapro Co.'s herring warehouses and fish powder factories at Cap aux Meulesson, Magdalene Islands, were destroyed by fire with damage estimated at $500,000.

Canadian Canners (Western) Ltd. will make first installation in Canada's canning industry of the Busse fully-automatic can-handling equipment in its new $1,750,000 plant under construction at Vancouver, B. C.

Cella Vineyard, Inc., Reedley, Calif., will produce, process and can 250,000 cases of a newly developed concentrated grape drink for Real Gold Co.

W. Clark Ltd. is constructing a new factory, warehouse and office at St. Remi, Que.

Clay County Rice Growers Cooperative Assn. has announced plans for construction of a $400,000 rice drying plant and 10 elevators with 40,000 bu. capacity.

El Dorado Bakery is building a $250,000 plant, office and sales outlet in San Jose, Calif.

Fine Foods of Canada has changed its corporate name to Green Giant of Canada, Ltd.

Foremost Dairies, Inc. has merged three Hawaiian dairy companies into its corporate structure: Moanalua Dairy Co., Rico Ice Cream Co., and Campos Dairy Farms.

General Mills, Inc. has been granted a permit to erect a $123,000 factory storage building at Toledo, Ohio.

Halben Foods Mfg. Co. has acquired manufacturing facilities of Fan-C-Foods, Inc. to add line of preserves and jellies to its present items.

Hawaiian Pineapple Co.'s new vice-presidents are George W. Burgess and R. R. Rohlfing.

Hickory Dairy Queen, Inc. has been capitalized at Hickory, N. C. for $100,000.

Interstate Bakeries Corp. has expanded its operations into the South by acquiring the facilities of Ambrosia Cake Co., which has bakeries in Fla., N. Car., and Ala.

H. W. Lay & Co., producer of potato chips, will build a $1,250,000 food processing plant in Richmond, Va. to consolidate six existing plants.

Correction

The Flavoring Extract Manufacturers Association of the United States will elect its officers at its 45th annual convention at the Biltmore Hotel, New York, May 16th to 19th. Last month it was erroneously reported that the officers of the Association were elected. This should have referred to the Flavoring Extract Manufacturers Association of California.

Louis L. Libby Foods Products, Inc., New York City, has appointed the following to the board of directors: Robert S. Graves, president, E. R. French, vice-president in charge of sales, C. B. Denman, vice-president and Edwin W. Bluhm, gen. prod. manager.

Lucerne Milk Co., subsidiary of Safeway Stores, has announced plans to build a $500,000 fluid milk plant in Milwaukie, Ore.

Maplecrest Farms, Inc. Denver, has announced impending construction of a new $250,000 poultry processing plant.

No-Cal Bottling Co. of Southern Calif., Inc., Long Beach, has received the first bottling franchise for No-Cal from Kirsch Beverages, Inc., Brooklyn and plans to produce more than 500,000 cases in its first year of operations.

Oriental Foods, Inc., of Los Angeles, will build a new $500,000 plant for production of canned and frozen-food products.

Van Camp Sea Food Co., Terminal Island Calif., has completed purchase of West Coast Packing Co.

Western Vinegars Ltd., has announced construction of a new plant in Edmonton which it claims will be the most modern vinegar installation in North America.

Personnel

D. N. Abercromby has been named general manager of Howe Candy Co., Ltd., Hamilton, Ont.

Frank Armour, Jr. was appointed vice-president in charge of all U. S. operations of H. J. Heinz Co.

Dr. Arthur N. Prater, president of Research and Development Assoc. of the Food and Container Institute of the Armed Forces, has been appointed vice-president and technical director of Gentry Div. of Consolidated Grocers Corp.

Henry Raken has been named manager of California Asparagus Growers Assn.

Herbert L. Barnet, now executive vice-president, was elected a director of Pepsi-cola International.

W. F. Bolster, secretary-treasurer for Bagwell Preserving Co., Nashville, has been named acting manager for the company.

Leslie F. Burrows is new director of Consolidated Bakeries of Canada Ltd.

A. Bernard Childress has resigned as assistant secretary and treasurer of Southern Biscuit Co. to become General manager of American Biscuit Co., of Tacoma, Wash.

John P. Dunn, beverage executive, has been appointed general manager of White Rock Bottling Co. of Arizona.

Harold Easterbrook is new manager of the Central California Berry Growers Assn. with headquarters at San Jose.

Joseph O. Emmett has been named general manager of Strietmann Biscuit Co.'s new Macon, Ga., plant.

William J. Higgins has been elected vice-president of White Rock Corp.

Edward F. Kaderabeck has been appointed general manager of the Chicago plant of Swift & Co.

H. S. Kirkpatrick is new general manager of the Dr. Pepper Bottling Co. in Dallas.

Dr. Eric Kneen, enzyme researcher, has been named a vice-president of Kurth Malting Co.

Mr. Robert D. Lowry, of Dewey and Almy Chemical Co., has been appointed to the Research Committee of the Institute of American Poultry Industries to serve as packaging expert.

L. N. Lucas, of Bastian Blessing Co., Inc., Chicago., has been elected president of the Dairy Industries Supply Assn.

Karl F. Mahlstedt, formerly vice-president and plant manager of Pratt Food Co. at Buffalo, was elected company president.

Augustine R. Marusi, vice-president of Eastern operations of Borden Co.'s Chemical Div., has been promoted to president of the Division.

Dr. Reid T. Milner, a director at Northern Regional Research Lab., Peoria, Ill., has been named professor and head of the food tech. dept., Uni. of Illinois.

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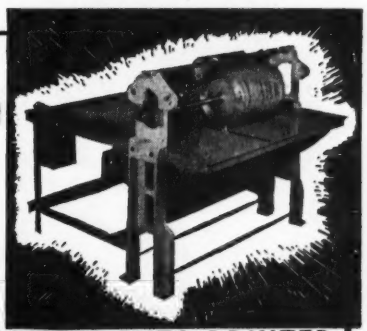

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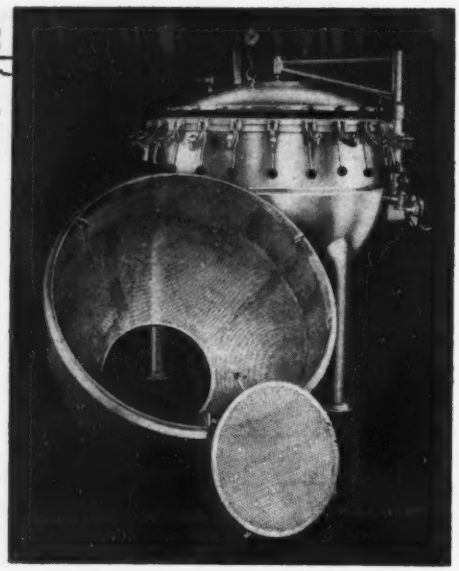

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Leo L. Sheehy, formerly in charge of meat and cereal buying operations of Beech-Nut Packing Co., has been appointed assistant to the president of Greendell Packing Corp., Prattsville, N. Y.

William Ostermann is new manager of Swift & Co.'s general margarine department.

Vincent J. Senn, formerly Assistant Professor of Agricultural Chemistry at the University of Florida, has joined the staff of the U. S. Citrus Products Station, Winter Haven, Fla., as biochemist.

Carroll M. Shanks, president of the Prudential Insurance Co. of America, was elected to the board of directors of National Biscuit Co.

Louis Stumberg, newly elected president of Patio Foods, Inc., has been named a director of Mexican Food Institute and member of the legislative committee of the Natl. Canners Assn.

Thomas J. Woods has been appointed resident manager of Schlitz Co.'s new $20 million brewery in Van Nuys, Calif.

Harry W. Zinsmaster has been named a member of the board of directors of Interstate Bakeries Corp.

Associated Industries

American Can Co. is building a new research and development center in Barrington, Ill. and will also open a new plant in Denver for the manufacture of beer and food cans.

Hall Brothers Co.'s new product manager for glass containers is Barney B. Freitag, Chicago.

Cenco Corp. has completed construction of a $100,000 research, development and engineering laboratory at its principal subsidiary, Central Scientific Co. in Chicago.

Chase Bag Co. has announced the following executive appointments: F. H. Ludington, Jr. vice-president; William N. Brock, vice-president and general sales manager; A. H. Nuhn, vice-president; and M. J. Bender, secretary.

Container Corp. of America has awarded the building contract for its new corrugated plant at Fernandina Beach, Fla. to S. S. Jacobs Co., Jacksonville.

Pacific Can Co., San Francisco, is building a $2.5 million plant in Sunnyvale, Calif., to turn out more than 250,000 cans a year.

Rheem Mfg. Co. has named Andrew W. Hughes as Eastern Region manager in charge of all manufacturing and marketing activities on the eastern seaboard, and Thomas A. Kelly to the newly created post of manager of manufacturing planning at Richmond, Calif.

Union Carbide and Carbon Corp. has announced the appointment of Harry B. McClure as president of subsidiary Carbide & Carbon Chemicals Co.

White Metal Mfg. Co., Hoboken, N. J. producers of collapsible tubes and metal containers, has named R. Smith Schenk, former president of Sun Tube Corp. as consultant.

Deaths

Nathan L. Bagwell, Jr., 40, vice-president of Bagwell Preserving Co.—Feb. 23.

William F. Bender, 51, of George H. Bender & Sons, manufacturers of pickled food products and sauerkraut.—Feb. 26.

Frank H. Burpee, 85, former director and vice-president of John J. Felen & Co., meat packers.—Feb. 23.

R. H. Kraft, 71, one of the founders of Kraft Food Co.—Feb. 16.

Lord Lyle, director of Canada & Dominion Sugar Co., Ltd. of Chatham, Ont.—Mar. 6.

Michael Mantia, 71, president of William Mantia Fruit Co., Inc., St. Louis.—Feb. 22.

Chris Papageorge, 73, one of founders of Malbis Baking Co.—Mar. 9.

Eugene W. Skinner, 70, president of Sealright Co., Inc.—Mar. 1.

William J. Underwood, 60, vice-president of William Underwood Co., food processors.—Mar. 2.

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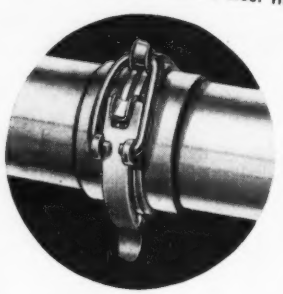

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Description and colorful diagrams and illustrations of operating characteristics of enclosed electric motor. Booklet GEA-6013. 16 p. —*General Electric Co., Schenectady, N. Y.*

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Description and diagrams of smooth hammered forgings, composite die sections and cast-to-shape tool steels with information on how to use and order. Handbook FC4. 28 p.—*Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22.*

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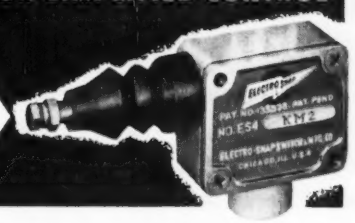

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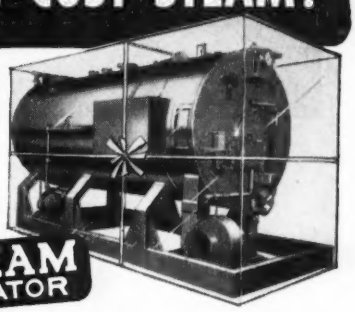

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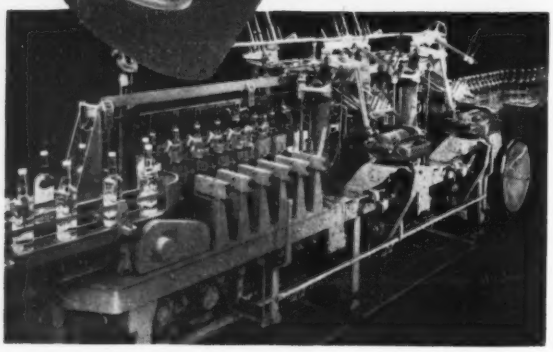

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(Continued on page 238)

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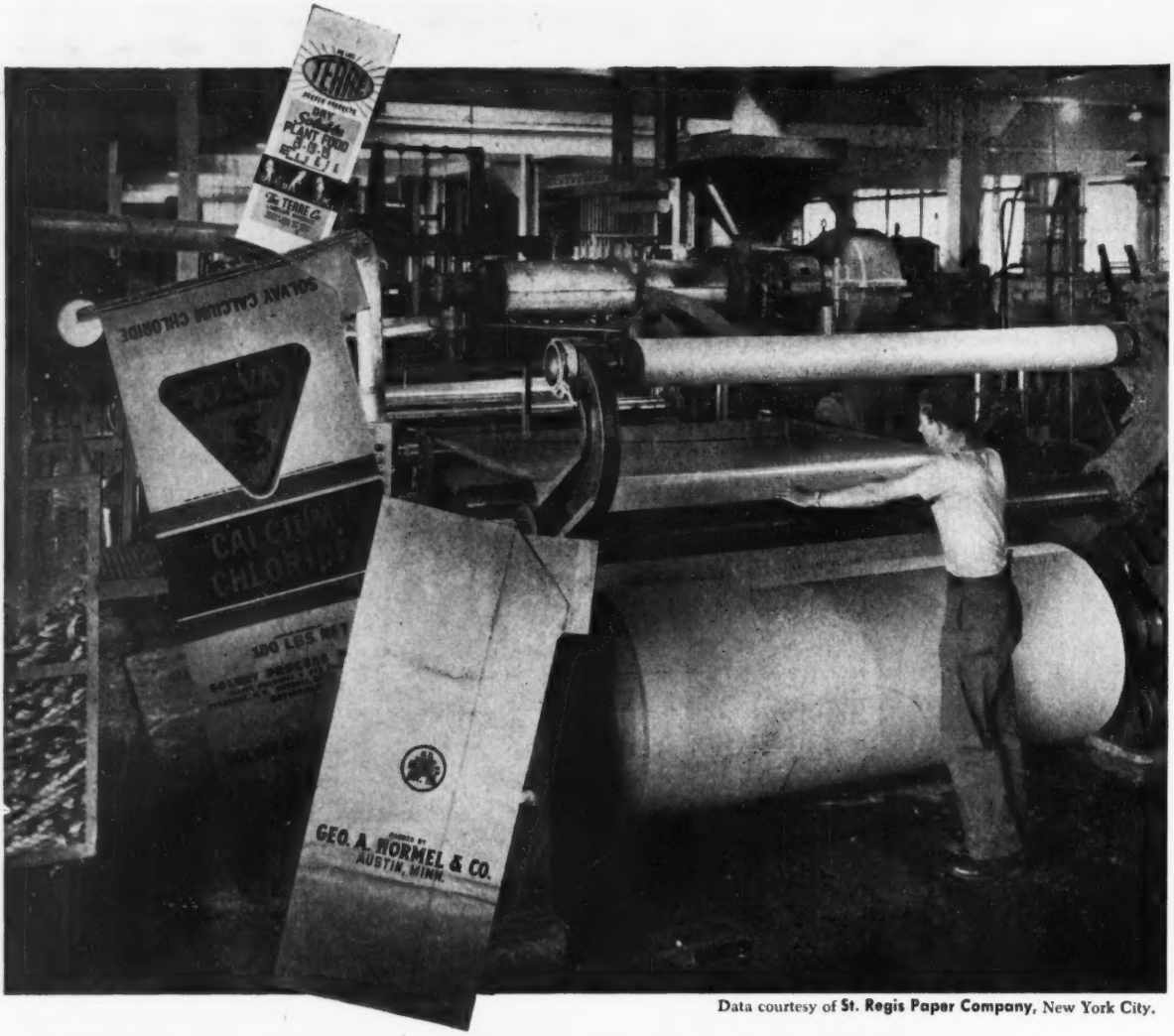

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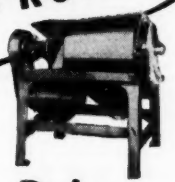

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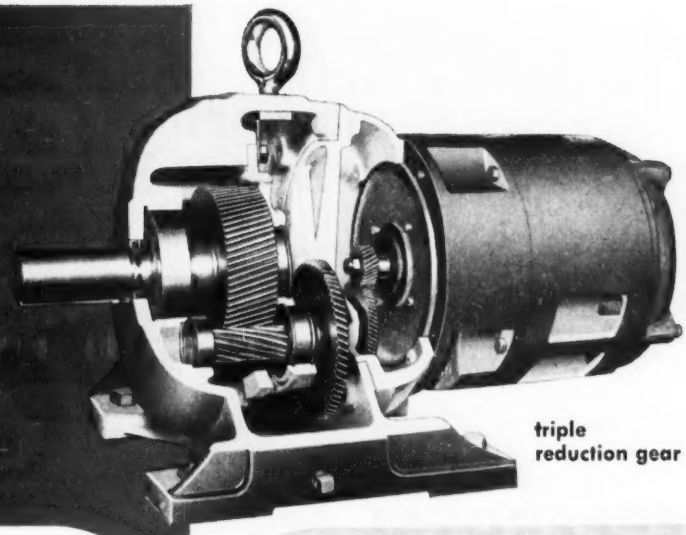

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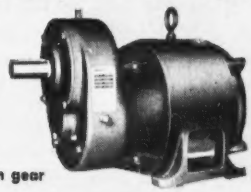

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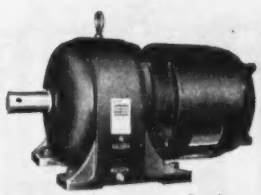

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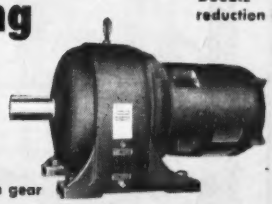

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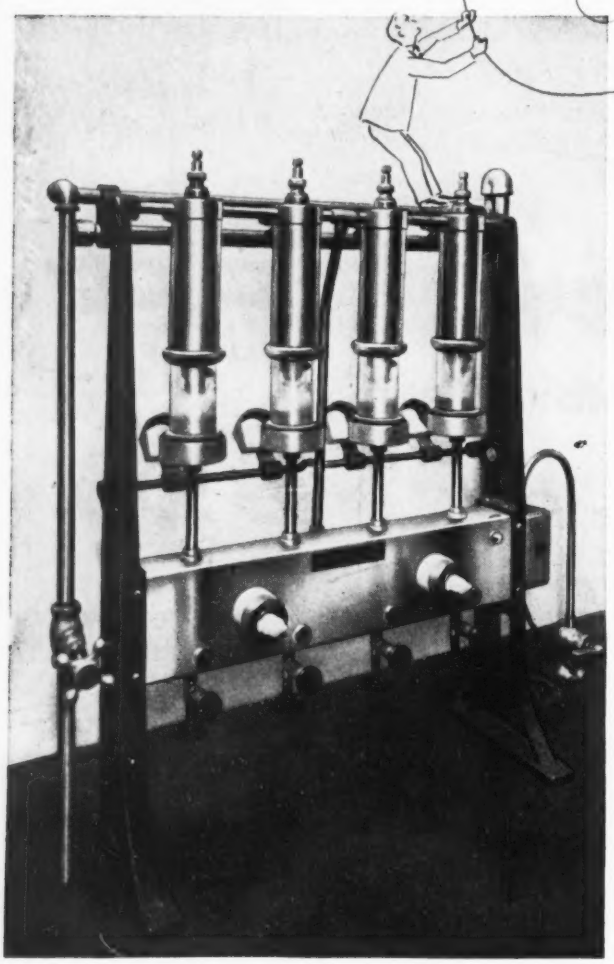

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2. Check refrigerant charge, add refrigerant if needed.
3. Check oil in compressors and other equipment, add York Oil if needed.

11. Clean water-cooled condensers once a year.
12. Check and adjust refrigerant controls.
13. Check and adjust safety controls.
14. Check operation of capacity reduction devices.
15. Examine compressors internally if necessary, make any repairs needed.

19. Paint equipment to protect it from deterioration.
20. Make seasonal adjustments and/or start up and shut down equipment per schedule
21. Drain water from all parts of system likely to freeze at end of cooling season.
22. Clean steam traps (air conditioning only).
23. Clean evaporator coils and/or dehumidifiers, check and clean spray nozzles.
24. Check and adjust controls and dampers for correct temperatures and air distribution.
25. Inspect air filters; clean or replace as necessary.

The proof, of course, is in the pudding—there are over 7,500 Certified Maintenance Contracts in effect today!

Details are yours for the asking. Contact your York District Office (in principal cities) or write to A.E.&M. Dept.

certified maintenance by york

YORK CORPORATION York YORK, PA.

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

For more information, use coupon on page 175.

Discovered!
A new kind of caster

the SERVICE PRESSWELD

"What is it?" you ask. Simply all the features Service has built into casters during half a century combined into one great new *quality line* of low-cost casters—SERVICE PRESSWELD CASTERS. None other combines these seven superiorities . . .

1—All swivel ball bearing raceways hardened to 50-C Rockwell.
2—¼" thick steel top plate and fork base, with 3/16" thick formed steel legs.
3—⅝" heat treated bolt and nut type king bolt.
4—Hollow bolt type axle Zerk-type lubrication fitting *fully recessed in head.*
5—Over-sized wheel bearing is ¾" Hyatt type roller running on ⅛" wall spanner bushing.
6—Spanner bushing is ¾" diameter, hardened to 50-C Rockwell, ground and polished.
7—Available with Ni-Steel-Iron, Moldon Rubber or Molded Plastic (Mascerated Canvas Phenolic Resin Impregnated) Wheels.

CAPACITIES—Up to 3200 Pounds per set of Four.

Get the whole picture . . .
Write for Circular

SERVICE CASTER & TRUCK CORP.

Albion, Michigan
414 N. Brownswood Ave.

Somerville, Massachusetts
440 Somerville Ave.

Miscellaneous

Laboratory Equipment Planning

Revised edition of comprehensive approach to better planning of laboratories, including recommended bidding practices. Catalog 35-E. 24 p.—*Laboratory Equipment Section, Scientific Apparatus Makers Assn., 20 N. Wacker Drive, Chicago 6.*

Circle 242A on Reader Service Card

Pump Installation

Right and wrong ways of installing and using positive displacement sanitary pumps with performance charts, operating data and conversion tables. 36 p. handbook.—*Dept. FE., Waukesha Foundry Co., Waukesha, Wis.*

Circle 242B on Reader Service Card

Poultry-Plant Cleaning

Information on specialized materials available for cleaning, deodorizing and sanitizing in poultry and egg-processing plants. Folder. —*Oakite Products, Inc., 126G Rector St., New York City 6.*

Circle 242C on Reader Service Card

Loading System

Data on effective machine loading system and products that implement it. Brochure KD738.—*Remington Rand Inc., 315 Fourth Ave., New York City 10.*

Circle 242D on Reader Service Card

Maintenance Control

Presentation of methods to improve maintenance control. Bulletin A-699. 6 p.—*McCaskey Register Div., Victor Adding Machine Co., Alliance, Ohio.*

Circle 242E on Reader Service Card

Production Case-Book

Concise and non-technical presentation of 46 case studies of industrial control problems, how they were solved and production costs greatly reduced through use of electronics. Vol. 2. 76 p.—*Photoswitch Inc., Cambridge, Mass.*

Circle 242F on Reader Service Card

Signal System

Description of various devices for signalling employees, to be used as part of internal telephone system. Circular 1752. 6 p.—*Automatic Electric Co., 1033 W. Van Buren St., Chicago 7.*

Circle 242G on Reader Service Card

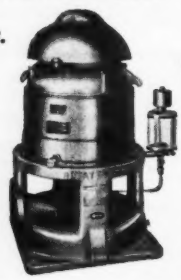
Combustion Processes

Graphic illustration and explanation of how too much or too little air can have costly effects in combustion processes. Bulletin AD-607.—*Arnold O. Beckman, Inc., 1020 Mission St., S. Pasadena, Calif.*

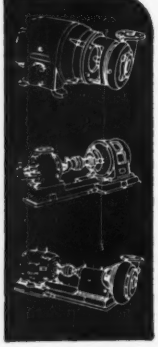
Circle 242H on Reader Service Card

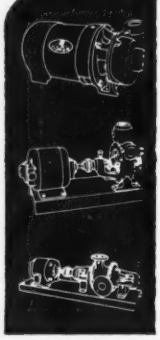
***You can Buy No Finer* DEEP WELL TURBINE**

CAPACITIES TO 5,000 G.P.M.
HEADS TO 400 FT.



OIL LUBRICATED (Bulletin 102-A)
WATER LUBRICATED (Bulletin 102-AA)





For dependable, low cost deep well water supply, install a Deep Well Turbine Pump "by Aurora." It will be a pleasure to send you descriptive data to explain why these distinguished pumps deliver an exceptional degree of satisfaction through EXTRA YEARS.

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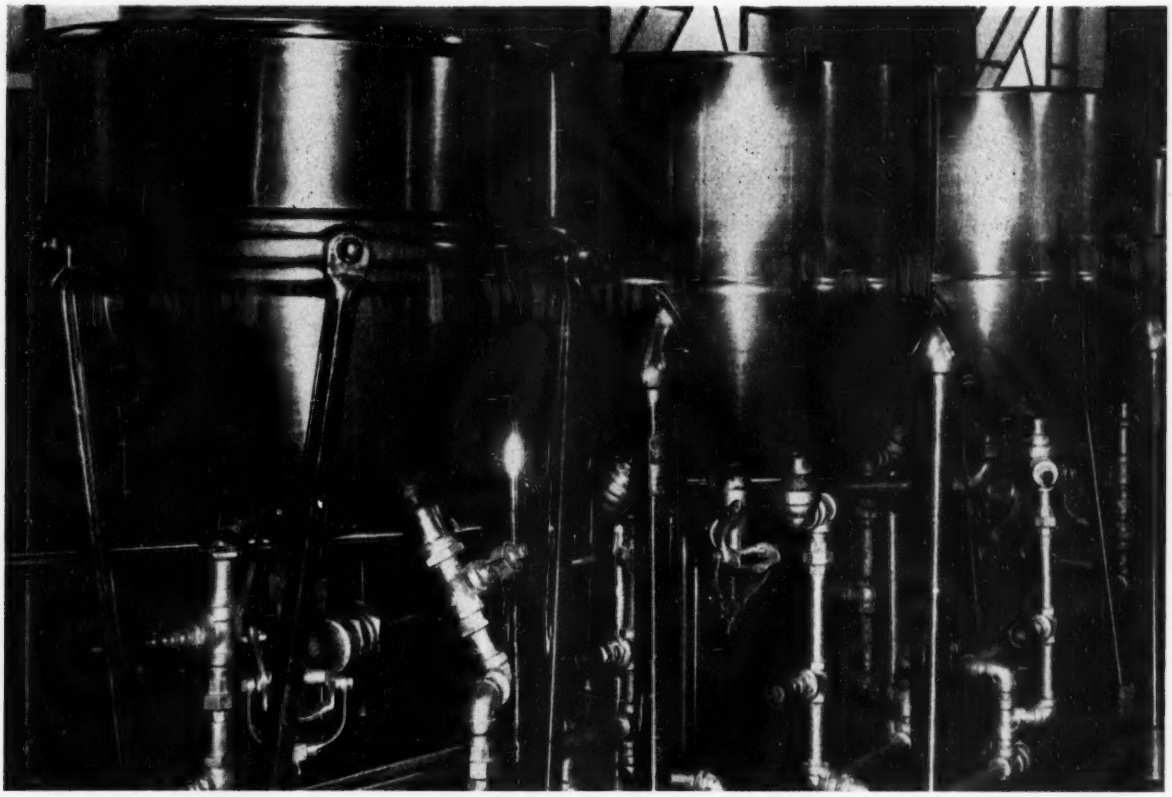
DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY

DIVISION OF THE NEW YORK AIR BRAKE COMPANY

71 DEARBORN STREET AURORA, ILLINOIS



ENDURO'S Bonus Benefits Keep Kettles Working

● Every trace of last-batch residue vanishes quickly with a rinse and a wipe, when your cooking equipment is made of ENDURO Stainless Steel. At the most, a simple wash with soap and water does the job . . . fast.

Equipment that comes clean fast is free to turn out more production per day. Products that you'll be proud to label because they're true to your recipe, with no pick-up or metallic contamination.

Easy cleaning is only one of the bonus benefits you get from ENDURO equipment. Resistance to food acids is another. There's no applied plating to chip, peel, or wear away. Contaminants find little foothold.

What's more you'll continue to get more batches for years to come because ENDURO lasts and lasts. No matter how you figure it, ENDURO Stainless Steel is the thrifty metal. Ask your supplier for more facts. Or, write Republic.

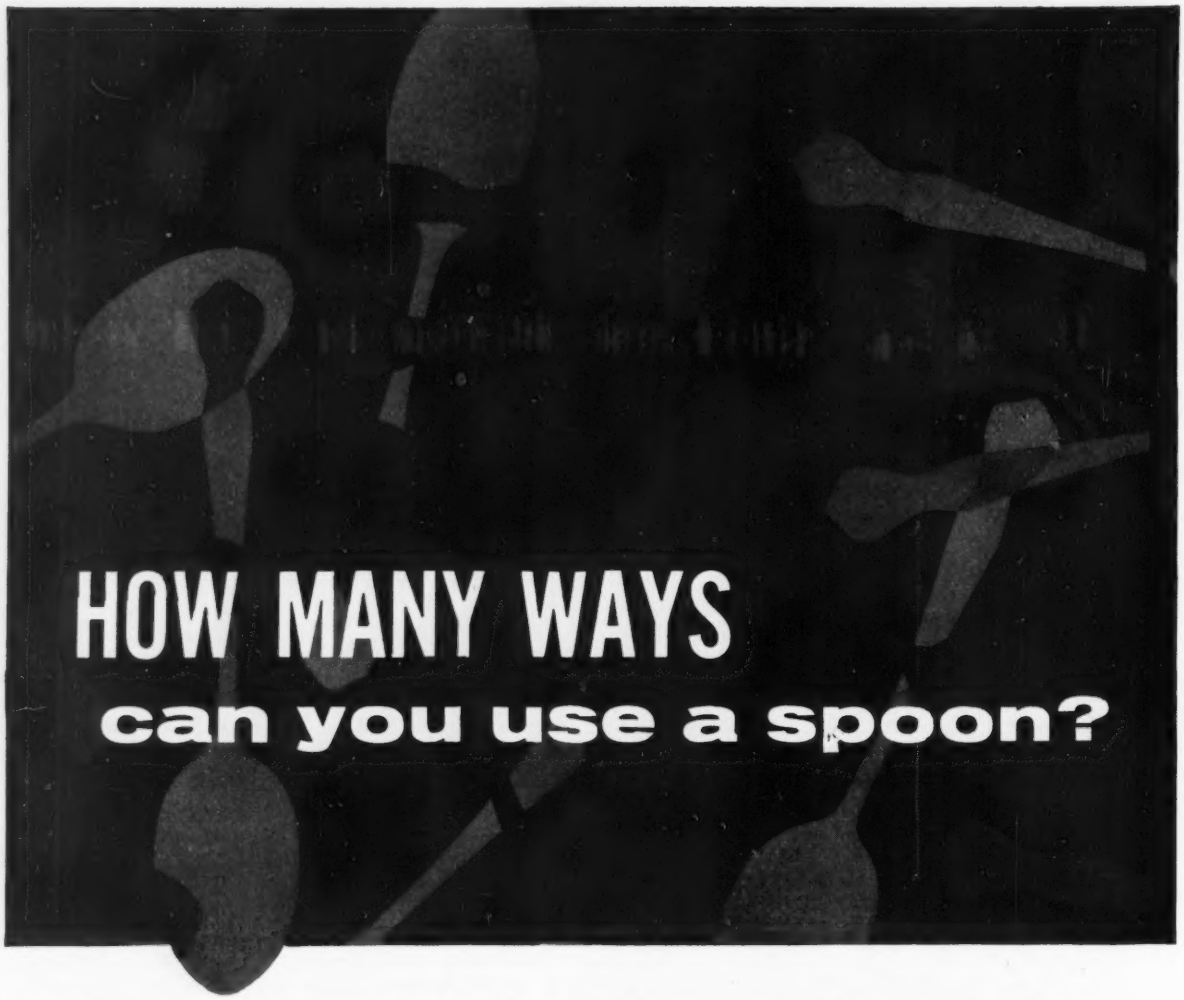
REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC
ENDURO STAINLESS STEEL

REPUBLIC STEEL

Other Republic Products include Titanium, Tin Plate, Steel and Plastic Pipe, Bolts and Nuts, Tubing, Barrels and Drums, Lockers, Shelving

For more information, use coupon on page 175.



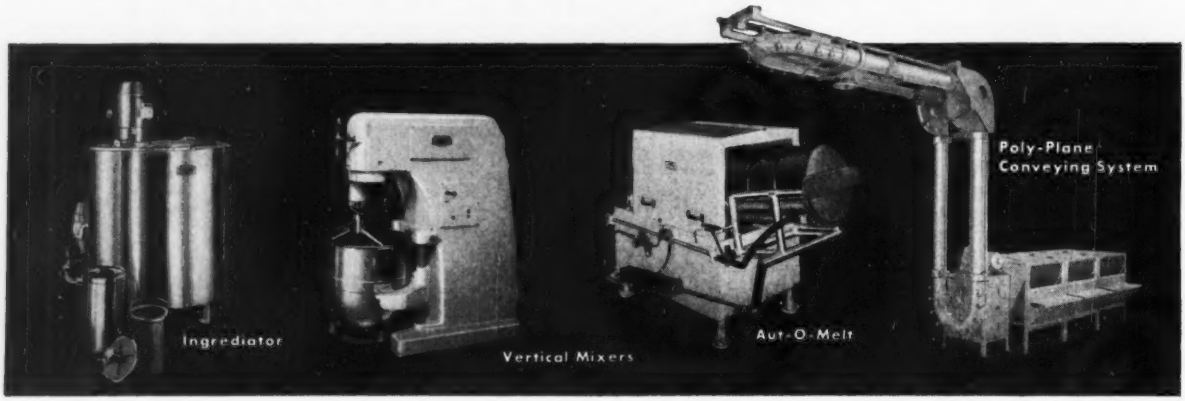
There's no limit . . . a spoon is a functional thing used many different ways to handle all kinds of food . . . it "belongs" to no one type of food. The same is basically true of materials handling equipment used throughout the food processing industry.

The Read Standard Corporation has developed several pieces of equipment once considered strictly for bakery use which have in recent years been accepted and heartily endorsed by food processors in all phases of the industry.

To learn more about this equipment, write to the Read Standard Corporation, York, Pa., and Los Angeles, Calif.

READ STANDARD
CORPORATION

BAKERY-CHEMICAL DIVISION
York, Pennsylvania • Los Angeles 39, California



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on every cleaning job with

cold steam

no back splash!
blasts stubborn dirt!
harmless to finest finish!

Connects to regular air and hot or cold water outlets.

HYDRO-AIR PRESSURE WASHER **$9.95**

PRESSURE CLEANS . . . Tanks, Blenders, Mixers, Cookers, Racks, Separators, Homogenizers, Pasteurizing Equipment, Air Filters, Dry Feeders, Bag Fillers, Trucks and other equipment.

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Professionally
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In today's competitive market—cost reduction through planned Materials Handling assumes major significance in profitable operations. Without obligation, our experienced engineers will make a preliminary survey of any plant or problem to determine the potential savings and the cost. *We invite your inquiry*

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CONSULTING **MATERIALS HANDLING** ENGINEERS
GREENWICH, CONNECTICUT
Over 20 Years' Experience

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. . . Buy Natural Spices

American Spice Trade Association
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The "Standard" for Truck Refrigeration Where Truck Returns to Garage Each Evening

NOW AVAILABLE in sizes to meet all requirements, in standard thicknesses of one inch, 1½"—2⅛"—2⅝". May be installed in horizontal position suspended from the ceiling, or in a vertical position along the walls, or as a partition. *Cold-Cels* maintain uniform temperatures throughout the trip regardless of ambient temperatures—Holdover solutions to maintain any temperature required.

* Write for *"Cold-Cels in Action"*—a pictorial brochure. Or send for Engineering Catalog CE.

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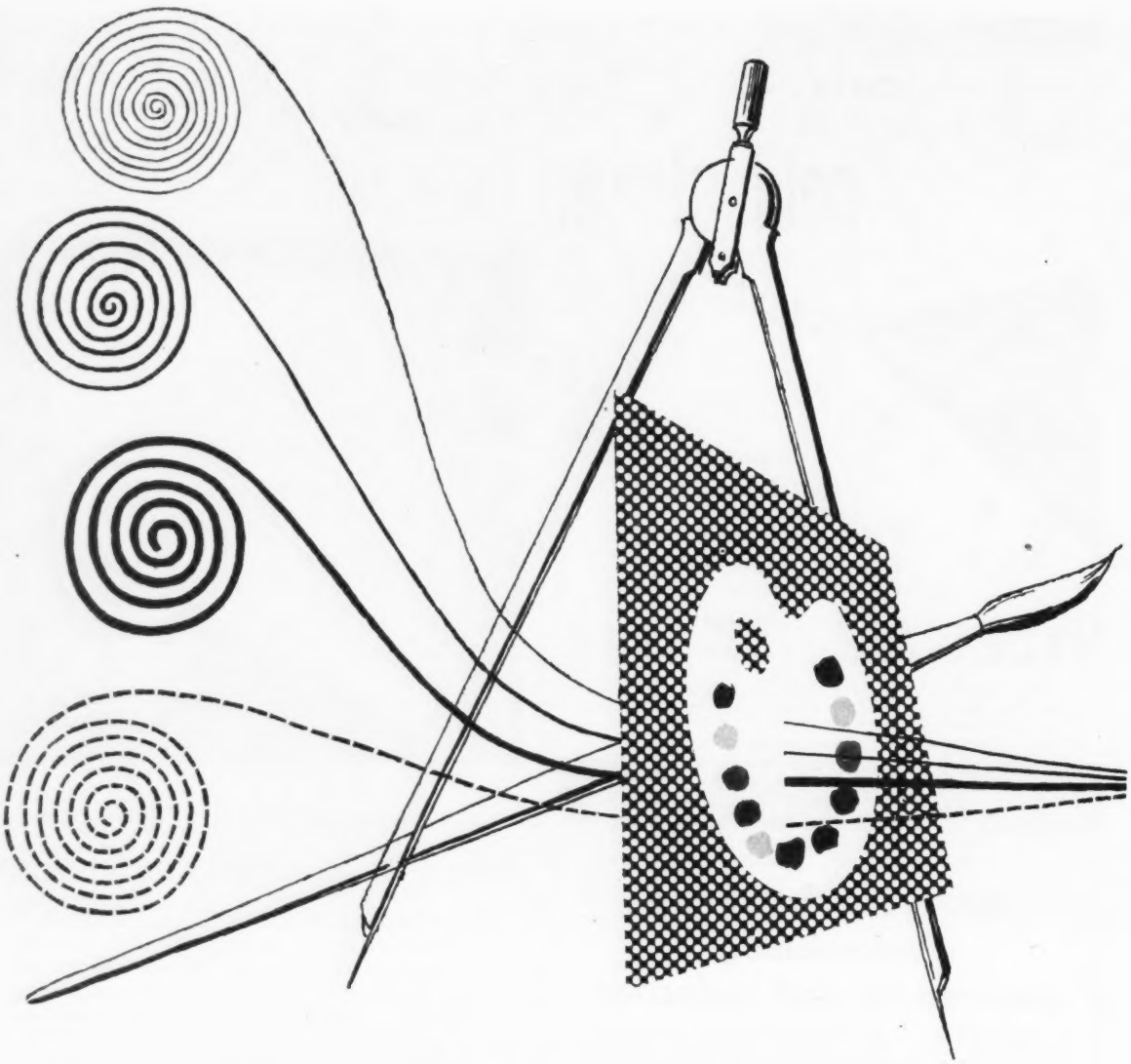
103 PARK AVENUE, NEW YORK 17, N. Y.
In Canada: Dole Refrigerating Products, Ltd.
44 Elgin Street, Brantford, Ontario

Maximum Refrigeration Efficiency
DOLE®
MANUFACTURERS OF
THE *Cel* LINE

For more information, use coupon on page 175.



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The raw materials which Shellmar-Betner converts, fabricates and prints are many: plastic films, foils, and papers. To our work, we bring complete knowledge of their properties and characteristics—alone and in combination—and how each of them can best be imprinted to carry a merchandising message. This knowledge, won over many years, works for you—as it works for hundreds of package buyers—whenever you call on Shellmar-Betner.

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FLEXIBLE PACKAGING DIVISION

MT. VERNON, OHIO

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Internationally Known
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Consultation on Food Problems
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Food Plant Design and Process Improvment
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Write for bulletin describing facilities and services
230 Washington St., Mount Vernon, N. Y.

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PLANT SANITATION—MANDATORY LABELING, LABORATORY SERVICES; Filth in foods, food analysis, bacteriological tests.

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Service to the Baking and Potato Chip Industries
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Project Research, Consultation, and Production Control Services in
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WHERE TO STORE FROZEN FOODS

INGREDIENTS FOR THE FOOD PROCESSOR

QUAKER CITY COLD STORAGE CO., INC.
PHILADELPHIA, PA.
3 WAREHOUSE LOCATIONS
Proper Temperature for Frozen Foods

New Advertisements

received by April 26th will appear in the May issue subject to limitation of space available. Address copy to the

FOOD ENGINEERING
330 W. 42nd St., New York 36, N. Y.

CARROT OIL makes food golden yellow

Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A. Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET

New 36-page combined catalog on carrot oil for foods, feeds, and pharmaceuticals. Important reading for most food processors. Write today!

NUTRITIONAL RESEARCH ASSOCIATES
205 Broad St., South Whitley, Ind.

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Send NEW ADVERTISEMENTS to New York City Office, 330 W. 42nd St., New York, 36, N. Y., for the May issue closing April 26th

WE NEED!
FOOD TECHNOLOGISTS and FOOD CANNING CANDIDATES
—junior to top-level.

Call, write or wire:
Gladys Hunting (Consultant)
Employment Counsel, Inc.
7 W. Madison St. Chicago 2, Ill.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

WANTED FOOD Technologist. Excellent opportunity for young Food Technologist with well rounded background and preferably production experience. Will represent large nationally known manufacturer of established line of specialty products. Sales experience highly desirable. Location central Mid-West area. Please send resume to Box P-2030, Food Engineering. All replies confidential.

FOOD CHEMIST and Technologist. Excellent opportunity in laboratory of Western New York State canning and freezing company. This position offers a real challenge to a man interested in making a career for himself in the food field. Prefer young man not over 30. Work to start June 1st when construction of new laboratory will be completed. P-2203, Food Engineering.

SELLING OPPORTUNITY OFFERED

WANTED DISTRIBUTOR for electronic Photometer and Turbidity Meter. Swiss precision built. Sturdy and simple construction. Absorption or dispersion measurements of turbidity of liquids like beer, fruit juices, drink water, waste water, etc. Adaptable for controlling continuous flow processes. Please write to J. W. Schlaepfer, 42 W. 73 St., New York 23, N. Y.

EMPLOYMENT SERVICE

SALARIED PERSONNEL, $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. F, 241 Orange St., New Haven, Conn.

POSITIONS WANTED

PLANT SUPERINTENDENT-Production Manager in a rut. Seeks challenging opportunity with progressive organization. Fifteen years diversified experience canning fruits and vegetables. PW-1946, Food Engineering.

FOOD TECHNOLOGIST B.S. Food Technology 1950. Age 28. Veteran three years experience: sales engineer for food processing equipment manufacturer. Seeks challenging position in sales or research and development. PW-2282, Food Engineering.

SAFETY ENGINEER—Effective accident control—plant and vehicle operations. Practical driver training program. Supervisory training. Ten years Food Plant experience. Graduate Engineer. PW-2294, Food Engineering.

PERSONNEL, SUPERVISION. 31, college. Inspired co-workers to co-operate happily for more business, promoted from ranks to personnel manager in one year, no union difficulties in seven years experience, reduced Absenteeism and turnover 60%. Presently employed. Desire personal interview. Will relocate. PW-2245, Food Engineering.

FOOD DEVELOPMENT MAN

Immediate need for top grade man to do food development work in our aggressive food research program. Candidates, 30-40 years old, must have technical training at or equivalent to B.S. Major field should be in either food technology, food and nutrition, cereal chemistry or bio-chemistry. Must possess a high degree of imagination and initiative and have demonstrated abilities to create new food products in the baking fields. Previous experience, 8-10 years, must include test baking and supervision of technical groups. Please include resume of training, experience, and salary requirements in initial reply.

Personnel Manager
Research Laboratories
GENERAL MILLS, Inc.
2010 East Hennepin Ave., Minneapolis 13, Minn.

CHEMICAL ENGINEERS

Immediate vacancies for Chemical Engineers to do process development work in the food industry at the pilot plant level in Minneapolis. May lead to future assignment in our food production plants throughout the U. S. 24-30 years old, B.S. degree in Chemical Engineering or Food Technology. 1-4 years of experience desirable, helpful to have some of this in food processing or food engineering. Please include resume of training, experience and salary requirements in initial reply.

Personnel Manager
Research Laboratories
GENERAL MILLS, Inc.
2010 East Hennepin Ave., Minneapolis 13, Minn.

WANTED
TO EXPEDITE PRODUCTION

Food Processing Equipment including Aluminum and S/S Kettles, Mixers, Vacuum Pans, Dehydration equipment, Grinders, Elevators, Stills, Colloid Mills, Conveyors, Filters, Packaging Units, Wrapping Machines. Will consider a set up plant now operating or shut down. When offering give full particulars.

P. O. Box 1351
Church Street Sta., New York 8, N. Y.

EQUIPMENT WANTED

Retort or any other type cooler for jelly jars, at moderate cost.

Describe make, condition and price.
Reply to:
P. O. Box 3498 Philadelphia, Pa.

FOOD PLANT WANTED

We are now manufacturing over $20,000,000 in various lines and wish to expand by acquisition of assets of stock of one or more industrial companies. In our negotiations the sellers' problems and wishes will receive full consideration. Present personnel will normally be retained.

Address all replies
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Chemical Engineering
Chemical Week
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E. & M. J. Markets
Engineering News-Record
Factory Mgt. & Maintenance
Fleet Owner
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National Petroleum News
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Pitroleum Processing
Power
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Classified Advertising Division

McGraw-Hill Publishing Co.

330 W. 42nd St., New York City 36, N. Y.

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. . . IS THE BEST BUY

SEE THESE VALUES!

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1—Sharples P14 Super-D-Canter 316, SS.
1—Fletcher 40" SS Suspended Centrifugal.
1—Bird 40" 347 Stainless Suspended Centrifugal.
1—2800 gallon 316 stainless steel Tank.
2—Aluminum Vertical Tanks 2300 gallons.
2—Hersey 3' x 26', 4' x 30' stainless steel Rotary Dryers.
2—Link Belt 2'7" x 8', 3'10" x 16' Roto-Louvre Dryers.
4—Devine Vacuum Dryers 4, 6 and 20—40" x 43" shelves.
3—Stokes 18" x 42", 30" x 8', 3' x 15' Rotary Vacuum Dryers.
3—Pfaudler 500 and 300 gallon, glass-lined, jacketed, agitated Kettles.
2—Pfaudler 100 gallon, glass-lined jacketed Stills.
4—Buflovak 5' x 12', 42" x 90", 32" x 52" and 24" x 36" double drum Dryers.
3—Groen 150, 125 gallon, stainless steel, agitated, jacketed Kettles.
5—Mikro Pulverizers #2TH, #2DH, #1SI, #1SH and Bantam.
1—Robinson 4000# Heavy Duty Mixer.
6—Rotex 40" x 120", 40" x 84", 20" x 48' single and double deck Sifters.
3—Sprout Waldron 40' x 84" single deck, stainless steel Sifters.
1—Sperry 24" Aluminum P & F Filter Press.
3—Sweetland Filters #7, #10, #12.
6—Oliver Rotary Filters 4'x5', 5'x5', 8'x8', 8'x10', 8'x12'.

Send for complete stock list

BRILL EQUIPMENT COMPANY
2401 Third Ave., N. Y. 51, N. Y.
Tel: CYpress 2-5703 - Cable: Briston, N. Y.

IN STOCK

STAINLESS STEEL TANKS

1—8000 gal. Horiz.—UNUSED
2—6000 gal. Vert.—Used
1—5700 gal. Horiz. T316—UNUSED
1—5700 gal. Horiz. T304—UNUSED
2—5000 gal. Vert.—Used
1—4500 gal. Vert.—UNUSED
1—3000 gal. Vert.—UNUSED
1—3000 gal. Horiz.—Used
1—2800 gal. Horiz.—Used
1—2000 gal. Vert.—UNUSED
1—1600 gal. Vert.—UNUSED
3—1000 gal. Vert.—UNUSED
20—from 15 gal. to 500 gal. sizes

STAINLESS STEEL JACKETED KETTLES

1—150 gal. Dbl. motion agit.
1—100 gal. Dbl. motion agit.—UNUSED
4— 65 gal. Pfaudler—UNUSED
6— 50 gal. Lee, tilting, 125# pr.

ALSO—stainless steel columns, heat exchangers, condensers, filters, etc.

PERRY EQUIPMENT CORP.
1411 N. 6th St. PHILA. 22, PA.

FIRST MACHINERY MOVING
ALL DEPARTMENTS UNDER 1 ROOF

• EXECUTIVE OFFICES • WAREHOUSE
• REBUILDING SHOPS etc.

EVERYTHING IN ONE LOCATION

For Better Service to our customers

209-289 Tenth St. Brooklyn, 15, N. Y.

NEARLY AN ACRE OF GOOD EQUIPMENT FOR YOUR INSPECTION

ALWAYS IN STOCK — **COMPLETE PLANTS FOR**

Kettles	Fruits
Tanks	Juices
Cookers	Vegetables
Vac. Pans	Citrus
Concentrators	Preserves
Evaporators	Syrups
Retorts	Dog Food
Sterilizers	Baby Foods
Filters	Edible Oils
Fillers	Distillery
Mixers	Brewery
Sifters	Meats
Screens	Coffee
Pulpers	Wines
Finishers	Pickles
Extractors	Kraut
Cutters	Pectin
Choppers	Vitamins
Dicers	Freezing
Grinders	Dehydrating
Peelers	Candy
Labelers	Fertilizer
etc. etc.	etc. etc.

Thousands of other units used in the Food and Allied Industries always on hand; send for our complete Listings.

FRED R. FIRSTENBERG, President

FIRST MACHINERY CORP.

209-289 TENTH ST. BROOKLYN 15, N. Y.

UNTIL WE GET OUR NEW PHONES, PLEASE CONTINUE TO PHONE WO. 6-3456

"CONSOLIDATED"

PIN POINTS TOP VALUES

TO SAVE YOU TIME AND MONEY

1—Read-Standard Horiz. Ribbon Mixer, 2000#, 480 gal. Practcially new; other sizes 1000# to 100#.
3—#12 Sweetland Filters, 48 bronze Monel covered leaves, 3" c.c. 2 unused, 1 slightly used.
1—Pfaudler G. L. jacketed Kettle, XP Motor, 200 gal.
2—1000 gal. MONEL jacketed agitated Kettles, XP Motors.
1—Monel Enzinger Filter, jack. 8 lvs.
1—B. P. "Ter-Meer" Contin. S.S. Centrifugal, 12" basekt, XP Motor.
3—Devine # 28 Vacuum Shelf Dryers, ea. 20 Shelves 59' x 78" Complete.
1—300 gal. Stainless jacketed, agitated Reaction Kettle.
1—Shriver 42" x 42" cast iron Pl. & Frame Filter Presses, 18 chambers.
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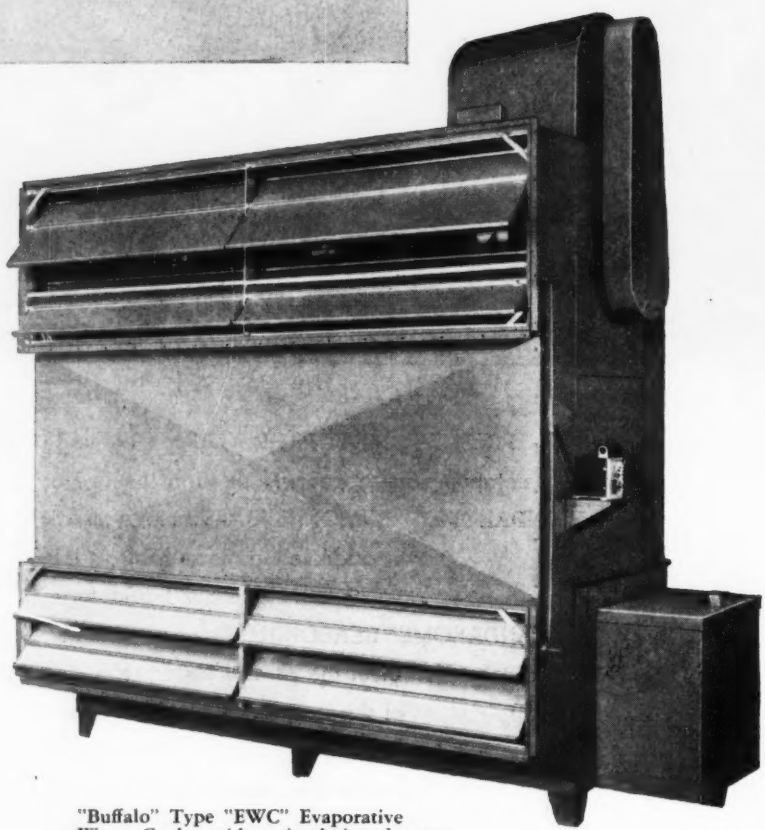

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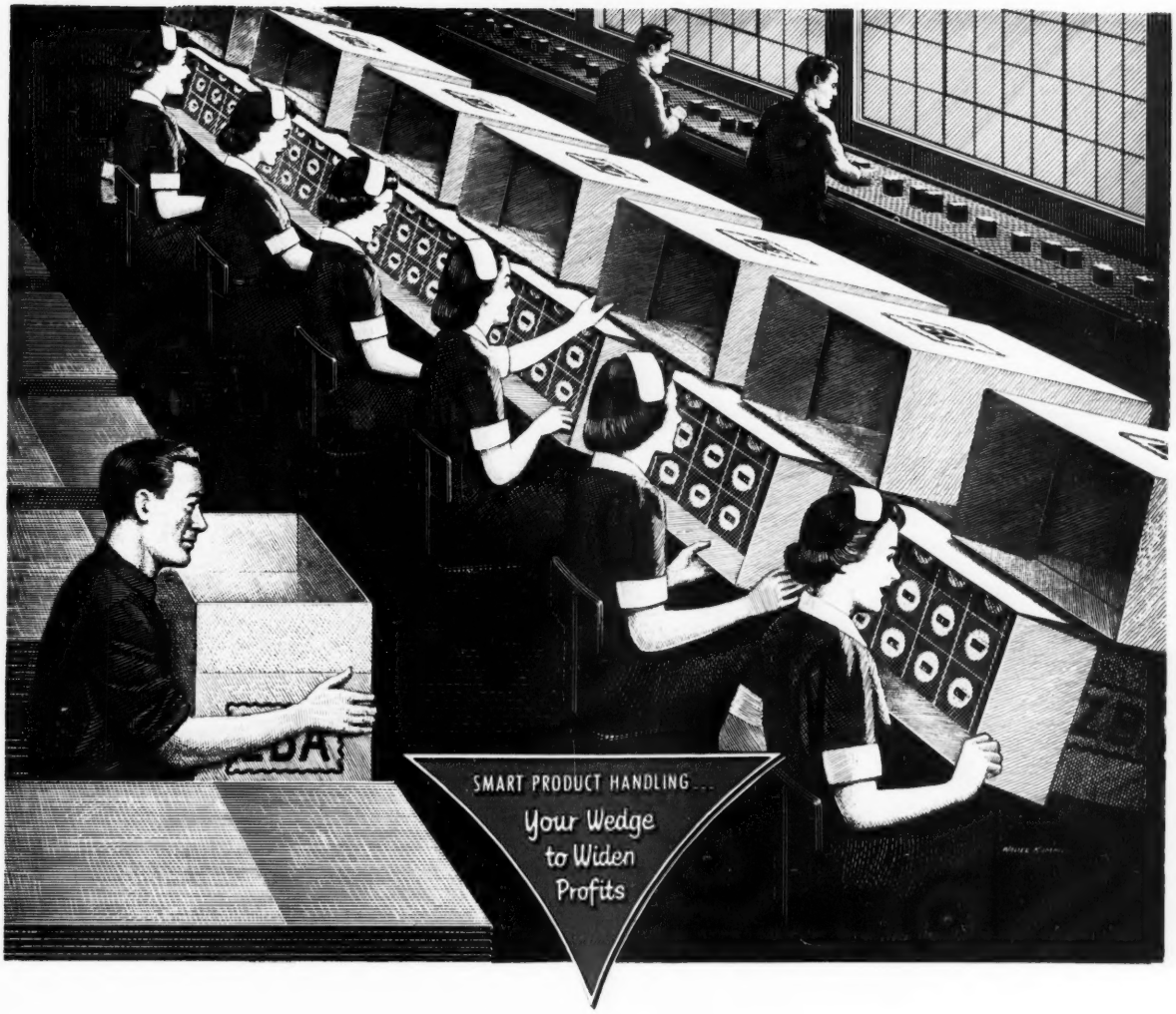

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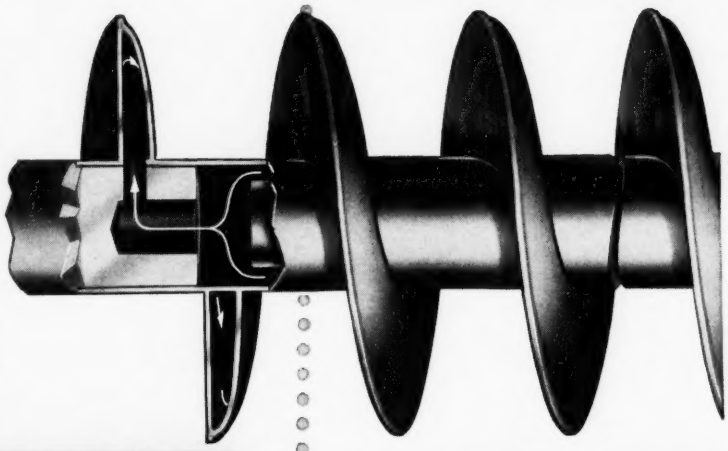
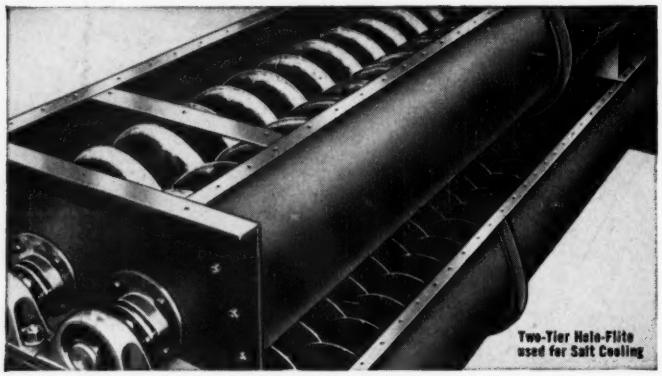
▶ **Permits Continuous, High Efficiency Operation!**

Backed by the same well-known organization that pioneered COTTRELL Precipitators, MULTICLONE Collectors and other leading products, the HOLO-FLITE Processor represents a far-reaching advancement in the science of heat-exchanger design. Widely adaptable to various types of cooling and similar applications in industrial processing operations, the HOLO-FLITE handles powdered or granular solids, moist pastes or slurries with equal facility. Moreover, it requires as little as 1/5th the space of other heat exchangers . . . causes no dust, therefore requires no costly or complicated auxiliary recovery equipment . . . and maintains its uniformly high efficiency under modern continuous-flow operations (no stop-and-go "batching" operations are necessary).





Two-Tier Holo-Flite used for Salt Cooling

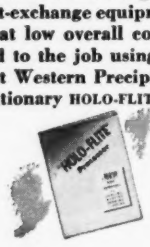
Unique Simplicity

Basically, the HOLO-FLITE consists of two or more hollow intermeshing conveyor screws that slowly rotate in a trough or tube. The cooling agent circulates through the hollow flights and shafts of the conveyor screws while the product itself "flows" in the trough where it is constantly rotated into, around, over and under the moving heat-exchange surfaces. The continuous mixing, turning, folding action causes a constant change of contact with the heat-exchange surfaces and results in a high rate of heat transfer. Yet the action is so gentle that there is no dusting and little, if any, abrasion of crystalline particles.

Unlimited Capacity

HOLO-FLITE Processors can be readily adapted to virtually any capacity requirement and are in daily operation on such varied products as sand, cement, cottonseed cake, soybean meal, borax, salt, sugar, baby foods, and many other products. Cooled products can be packaged directly from the HOLO-FLITE discharge, saving time, space and additional handling.

Be sure to investigate HOLO-FLITE savings before you install heat-exchange equipment. To insure maximum operating efficiency at low overall cost, each installation is individually engineered to the job using basic stock-size elements. Contact the nearest Western Precipitation office for further details on the revolutionary HOLO-FLITE Processor—or write direct!



FREE! New 8 Page Bulletin describing HOLO-FLITE features and applications will gladly be sent on request!

*Reg. T.M.

A FEW OF MANY HOLO-FLITE ADVANTAGES

WIDE ADAPTABILITY: HOLO-FLITE handles fine-grained, crystalline or powdered solids, pulps, pastes and slurries with equal ease. Heat transfer agent can be refrigerant, cooled or ambient water, or other fluids to provide a wide range of processing temperatures.

SPACE-SAVING COMPACTNESS: Because of its large active heat-transfer surface per cubic foot of space required, the HOLO-FLITE requires only a minimum of space—is 5 to 6 times as compact as other equipment of comparable capacity!

LOW POWER REQUIREMENTS: HOLO-FLITE conveyor screws rotate slowly—usually only 1 to 12 r.p.m. Further, multiple tiers can be driven by one motor, assuring low power consumption.

INSTALLATION FLEXIBILITY: The basic HOLO-FLITE unit is two intermeshing screws in a single trough, but four or six screws per trough can also be installed. Moreover, any number of troughs can be "tiered" on top of one another—trough lengths can be varied from 8 to 20 ft.—screw diameters can be varied from 7" to 16"—to provide virtually any desired capacity in a minimum of space!

Write for full details on the many savings the HOLO-FLITE *Processor can bring to your particular applications.*

WESTERN Precipitation CORPORATION

DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

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